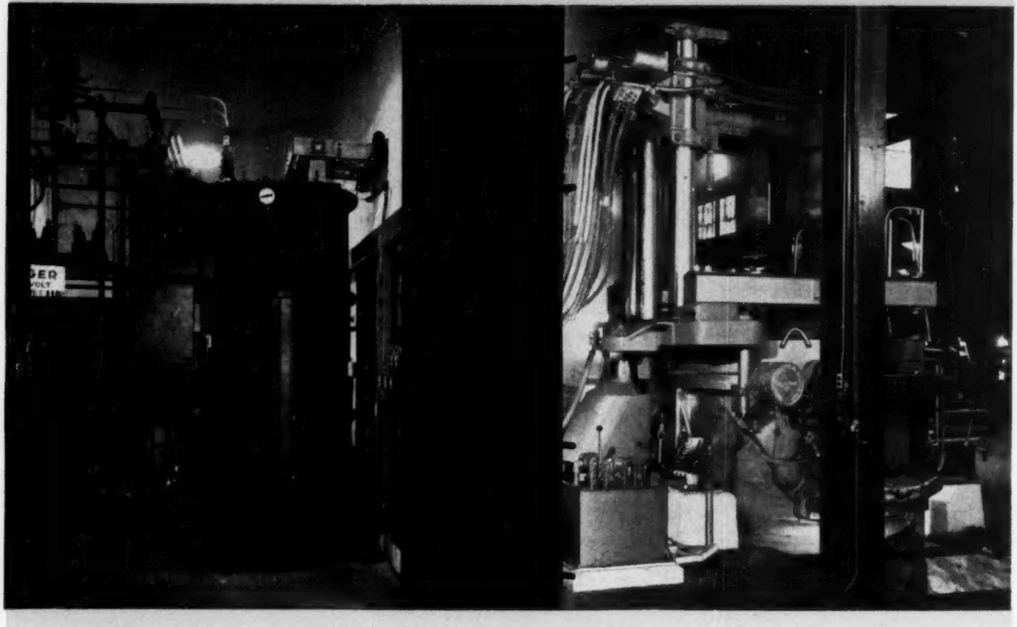
American Foundryman

THE FOUNDRYMEN'S OWN MAGAZINE

November 1950

Not visible here is another Lectromelt Furnace; an old timer whose fine performance was responsible for the purchase of this new furnace.



IN THE ROOM BEHIND YOUR *Lectromelt* FURNACE

An electric arc furnace works with such fuss and fury that it gets all the credit for a job well done. Here you get an unaccustomed look at its silent partner, upon whom so much depends.

Housed in this room, away from the dust and dirt, are the brains of this Lectromelt Furnace — the controls which position the electrodes and adjust the current to meet each instant's demands, the transformer that supplies an uninterrupted flow of power to the furnace.

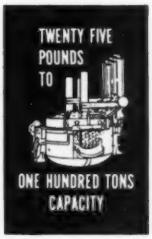
Lectromelt engineers consider the equipment that goes into this room behind the furnace just as important as the furnace itself. With these men to help on your melting, refining, smelting or reduction problems, you benefit by their years of experience in substation as well as furnace design.

Bulletin No. 7 tells you more about furnaces and their accessory equipment. Pittsburgh Lectromelt Furnace Corporation, 300 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . SWEDEN: Birlec, Elektkougnar A B, Stockholm . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*



MODERN Ladles Pour the Nonferrous Metal

1500 TAPS IN THREE MONTHS

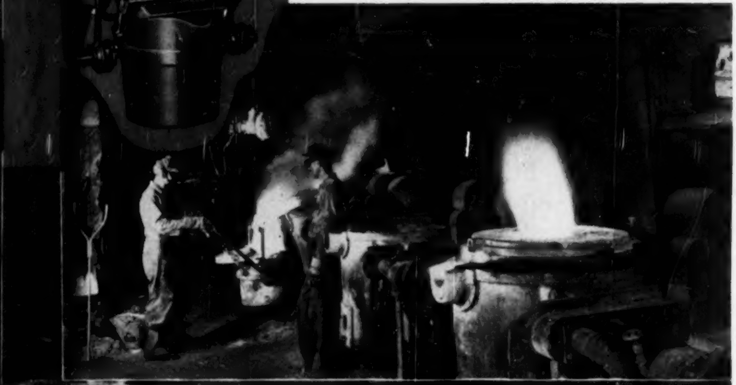
This MODERN ladle, in service here at the Milwaukee Flush Valve Company, handles all the plumber-brass from a battery of four, 650 pound oil furnaces.

The heat is brought down in one hour. Metal is tapped at 2275° F. At the last mold the brass still flows at 2100° F. to maintain the same high quality from the first to the twenty-fifth casting poured.

Between heats the ladle temperature is brought up in an oil pre-heater.

MODERN Ladle, Pouring Device, Monorail and Crane are engineered as a unit for one-man pouring.

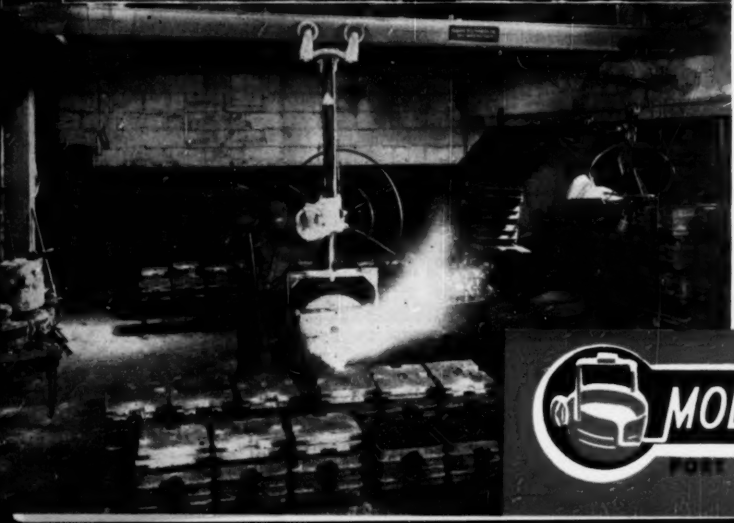
Every detail of design — from the fast-action, pull-back ladle cover to the free movement and smooth transfer of the load over the monorail and crane—is a part of MODERN planning for economical, one-man pouring.



Here the entire heat, 650 pounds of brass, is drawn in two taps. 325 pounds per trip from furnace room to pouring floor uniformly fills the 25 molds in approximately six minutes.

There's seldom any metal left over to be pigged. Every ounce crosses the pay scale.

It'll pay you well to pre-plan your pouring for profits. And the savings you make on your MODERN engineered-to-the-job ladles can be applied to your purchases of MODERN POURING DEVICES, MONORAIL SYSTEMS and foundry CRANES! For the complete MODERN story call your local MODERN representative. Ladle catalog 149 will be mailed free if you make request on your company letterhead — Dept. AF-11 . . .



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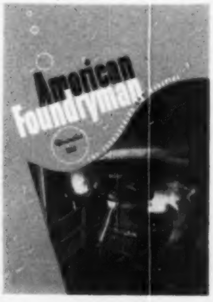

Continuous-tap, front-slagging cupola, shown during melting operations at Lynchburg Foundry Co., Lynchburg, Va., has cylindrical forehearth for desulphurization of metal. Fused soda ash slag is coming from center of forehearth and cupola slag can be seen coming over spout near the cupola. Both slags are tapped directly into the Lynchburg Plant's water disposal system.

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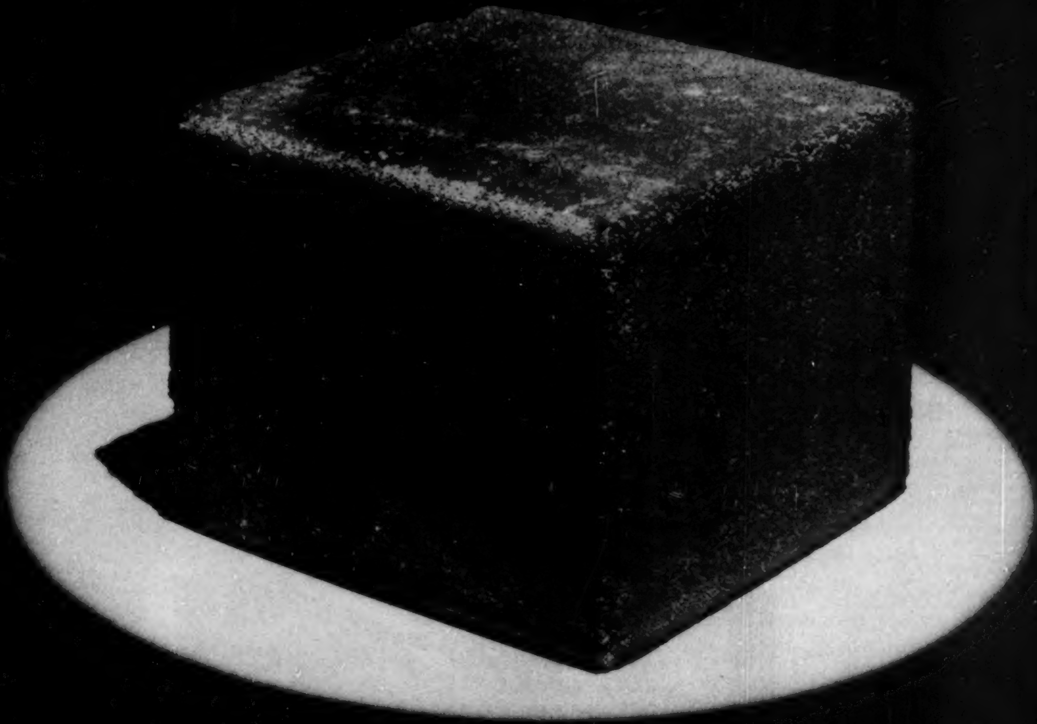
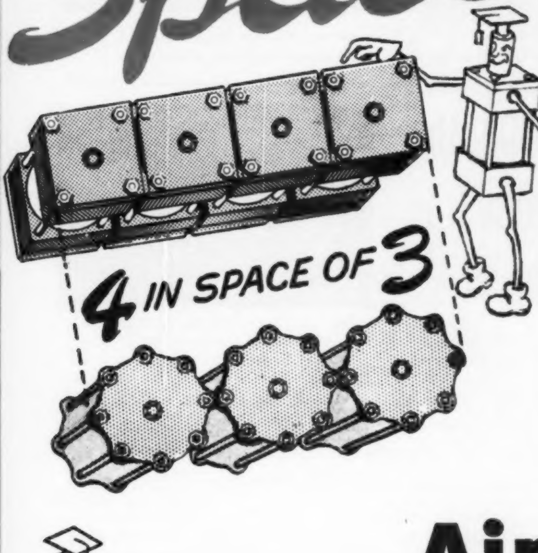
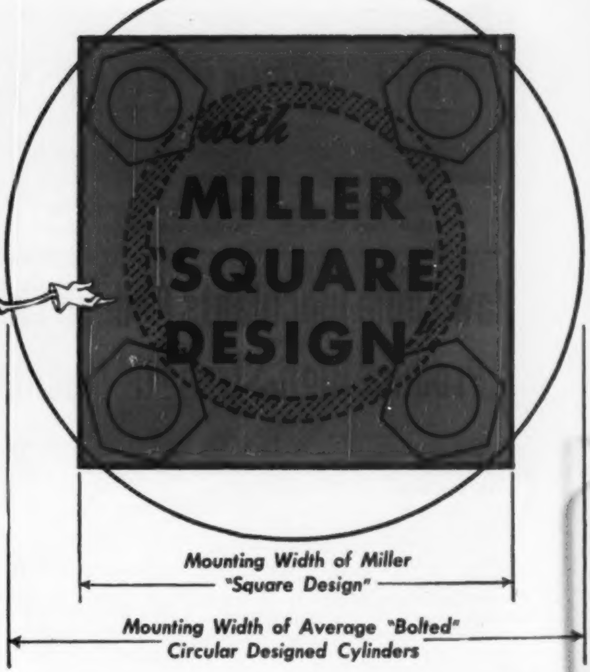


Save Space





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- More Cylinder Power in Same space
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- Simplify Designing and Installation
- Save hours of Drafting Time

The SQUARE DESIGN of Miller Cylinders saves up to 25% of mounting space, permitting more cylinder power in the same space and easier, more convenient installation in "tight spots." Thus, in many cases, machines and equipment can be designed more compact and less costly by using Miller Cylinders. Hours of drafting time can be saved — as only a few straight lines show any view on drawings.

The illustration at upper left shows graphically how *four* Miller Cylinders can be mounted, bore for bore, in the same space required for *three* average "bolted" circular designed cylinders. Some Miller bore sizes permit even greater space-savings.

Other important *standard* features of all Miller Cylinders include: solid steel heads, caps and mountings, hard chrome plated piston rods, dirt wiper seals, and other "quality" features as shown in illustrated bulletins sent FREE on request. Remember, too, that Miller Hydraulic Cylinders (2000-3000 psi) meet the J. I. C. Hydraulic Standards.

Write for illustrated cylinder bulletins A-105 and H-104

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ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How Ladle Inoculants Reduce Chill Depth ...Produce High-Strength, Machinable Iron

One of the most significant developments in the field of cast iron metallurgy during recent years has been the widespread growth of the process of "inoculation" in producing quality metal to strict specifications. Inoculation has been defined as "a process in which an addition is made to molten cast iron for the purpose of altering or modifying the micro-structure of the iron and thereby improving the mechanical and physical properties to a degree not explainable on the basis of the change in composition."*

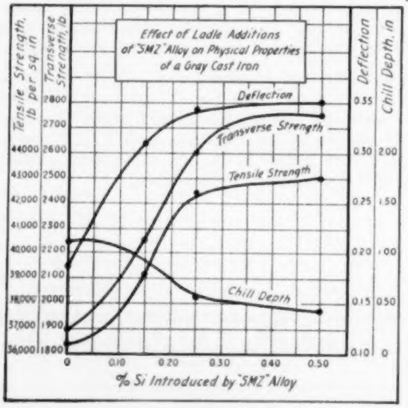
Various ladle addition alloys are used for inoculation of cast iron, but there is a wide range in the efficiency and potency of these materials. The 50 per cent and 75 per cent ferrosilicons are mild inoculants, but they are used as ladle additions principally as a means of adjusting the silicon content of cast iron. The 85 per cent and 90 per cent grades of ferrosilicon are much more effective inoculants. Inoculating power is further improved through the use of special inoculating alloys, such as silicon-manganese-zirconium ("SMZ" alloy) and calcium-silicon.

ELECTROMET produces a number of alloys for inoculation, each of which has specific applications. The graphitizing inoculants are:

"SMZ" Alloy	60-65% silicon 5-7% manganese 5-7% zirconium
Calcium-Silicon	30-33% calcium 60-65% silicon
90% Ferrosilicon	92-95% silicon
85% Ferrosilicon	83-88% silicon
Special Graphitizer	A mixture of ferrosilicon and graphite for special uses.
75% Ferrosilicon	73-78% silicon
50% Ferrosilicon	47-51% silicon
Ferromanganese-Silicon Mix	20-25% manganese 47-54% silicon

These inoculants are usually added to the molten iron as it leaves the cupola spout, or during transfer from one ladle to another.

*Definition by H. W. Lownie, Jr.—A.F.S. Symposium on "Inoculation of Gray Cast Iron."



Effects of Inoculation

The effects of graphitizing inoculants are: a drastic decrease in the chilling tendency of a given iron, a mild decrease in Brinell hardness, lowering of the section sensitivity of the metal, a definite increase in tensile strength, and an increase in transverse strength and deflection. These benefits are usually accompanied by improved fluidity, better castability, and improved resistance to wear.

Stabilizing Inoculants

In addition to the graphitizing inoculants listed above, there are several stabilizing inoculants containing substantial percentages of chromium. These inoculants improve resistance to wear, heat, and corrosion, with no appreciable increase in the chilling tendency. Stabilizing inoculants furnished by ELECTROMET include:

"CMSZ" #4 Mixture	45-49% chromium 4-6% manganese 18-21% silicon 1.25-1.75% zirconium
"CMSZ" #5 Mixture	50-56% chromium 4-6% manganese 13.50-16.00% silicon 0.75-1.25% zirconium
Low-Carbon Foundry Ferrochrome No. 2	50-54% chromium 28-32% silicon 1.25% max. carbon

Fig. 1—These curves show how additions of "SMZ" alloy reduce depth of chill and improve mechanical properties when added to a series of irons selected to give the following final analysis: 3.10 total carbon, 0.60 combined carbon, 1.80 silicon, and 0.50 manganese.

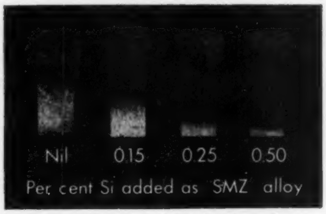


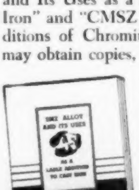
Fig. 2—These chill blocks show how progressive additions of "SMZ" alloy reduce the depth of chill.

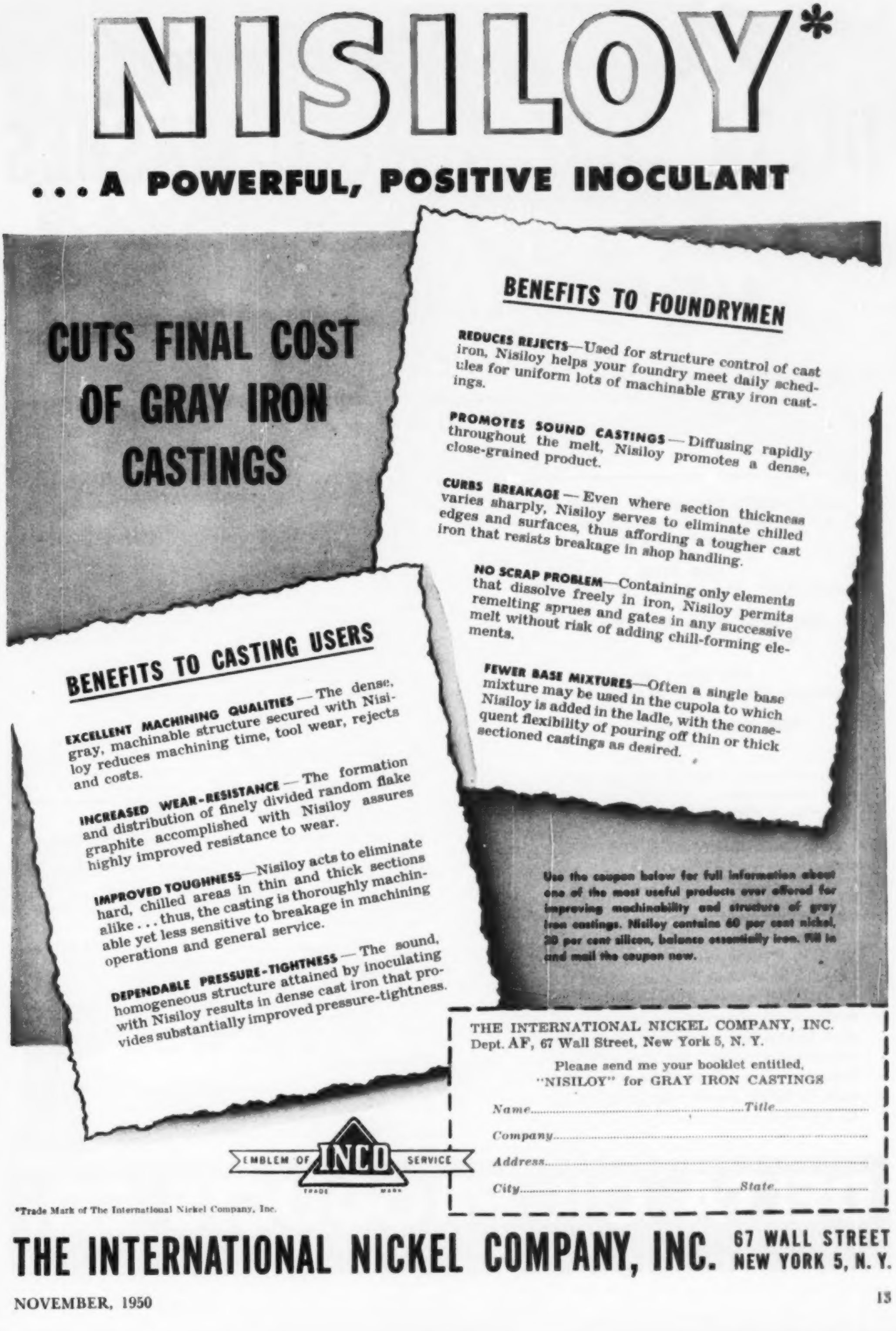
"SMZ" Alloy—An Efficient Inoculant

The benefits of inoculation are obtained largely as the result of rigid control of the structure of the graphite phase of cast iron which has received this treatment. The results of inoculation on the properties of a typical cast iron are demonstrated by the accompanying illustrations showing the effect of adding various amounts of "SMZ" alloy.

Booklets Available

Further information about ladle inoculants is given in the booklets, "SMZ Alloy and Its Uses as a Ladle Addition to Cast Iron" and "CMSZ Mixtures for Ladle Additions of Chromium to Cast Iron." You may obtain copies, free of charge, by writing or phoning to the address given above or to the nearest ELECTROMET office: in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York, Pittsburgh, or San Francisco. In Canada: Welland, Ontario.




NISILOY*
...A POWERFUL, POSITIVE INOCULANT
CUTS FINAL COST OF GRAY IRON CASTINGS
BENEFITS TO FOUNDRYMEN
REDUCES REJECTS—Used for structure control of cast iron, Nisiloy helps your foundry meet daily schedules for uniform lots of machinable gray iron castings.
PROMOTES SOUND CASTINGS—Diffusing rapidly throughout the melt, Nisiloy promotes a dense, close-grained product.
CURBS BREAKAGE—Even where section thickness varies sharply, Nisiloy serves to eliminate chilled edges and surfaces, thus affording a tougher cast iron that resists breakage in shop handling.
NO SCRAP PROBLEM—Containing only elements that dissolve freely in iron, Nisiloy permits remelting sprues and gates in any successive melt without risk of adding chill-forming elements.
FEWER BASE MIXTURES—Often a single base mixture may be used in the cupola to which Nisiloy is added in the ladle, with the consequent flexibility of pouring off thin or thick sectioned castings as desired.
BENEFITS TO CASTING USERS
EXCELLENT MACHINING QUALITIES—The dense, gray, machinable structure secured with Nisiloy reduces machining time, tool wear, rejects and costs.
INCREASED WEAR-RESISTANCE—The formation and distribution of finely divided random flake graphite accomplished with Nisiloy assures highly improved resistance to wear.
IMPROVED TOUGHNESS—Nisiloy acts to eliminate hard, chilled areas in thin and thick sections alike . . . thus, the casting is thoroughly machinable yet less sensitive to breakage in machining operations and general service.
DEPENDABLE PRESSURE-TIGHTNESS—The sound, homogeneous structure attained by inoculating with Nisiloy results in dense cast iron that provides substantially improved pressure-tightness.
Use the coupon below for full information about one of the most useful products ever offered for improving machinability and structure of gray iron castings. Nisiloy contains 60 per cent nickel, 30 per cent silicon, balance essentially iron. Fill in and mail the coupon now.
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Foundry CORE Practice

A Revision of "MODERN CORE PRACTICE AND THEORIES"

. . . dealing exclusively with the production and use of cores in the modern foundry

Fig. 117—Bench-type Core Blowing Machine

Fig. 190—High-frequency Dielectric Core Baking Oven

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- FACTORS AFFECTING CORE BAKING
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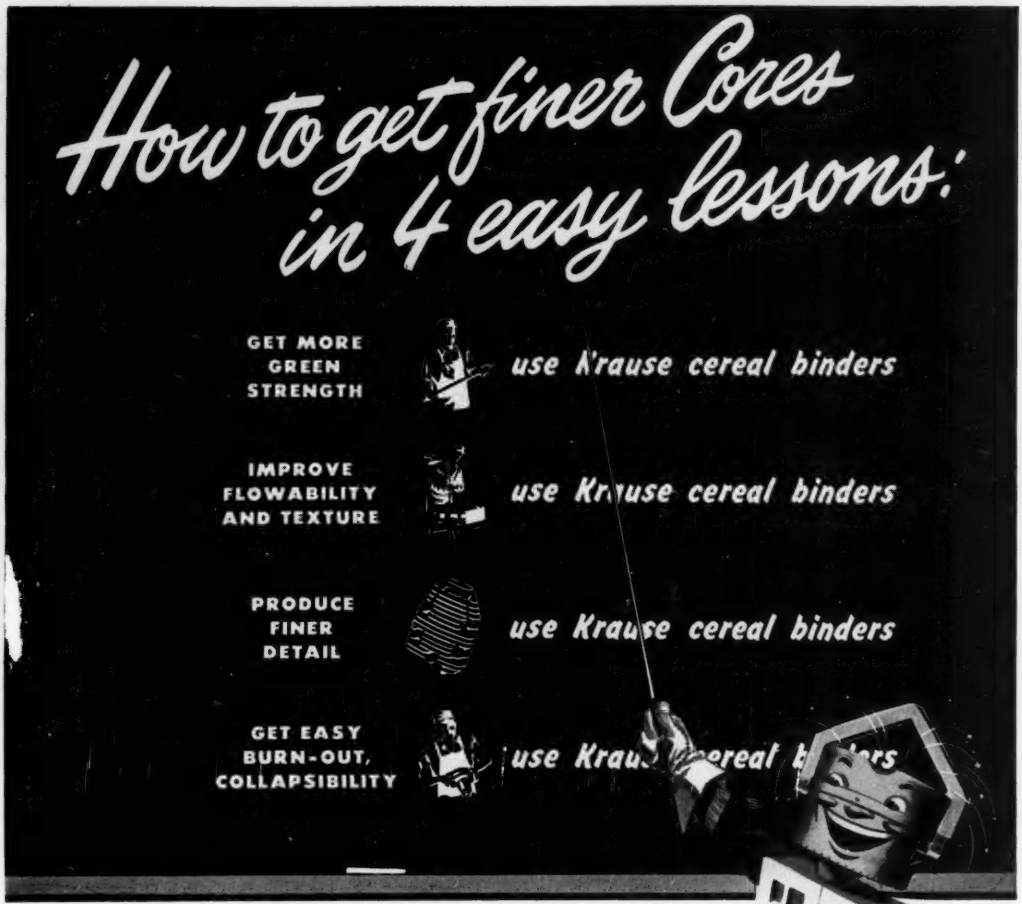

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All the Same Sand!

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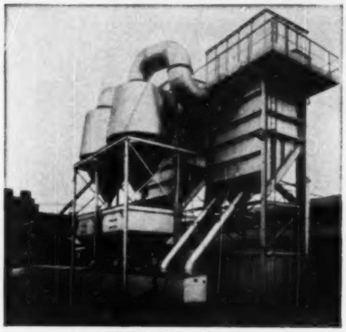
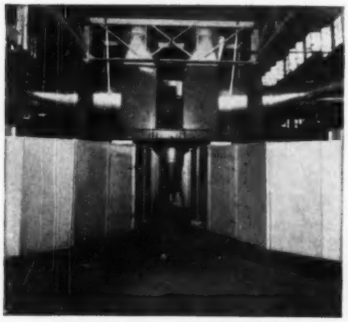


Cyclone Collector

Installed with cloth screen arrester on exhaust system for foundry and cleaning room. An arrangement, worked out by Schmieg engineers, by which the collector was installed ahead of the arrester greatly lengthened the life of the screens by reducing dust concentration.

Exhaust System

A typical exhaust system for foundry cleaning room equipment, such as wire brushing machines, etc., illustrates the advantages of using Schmieg equipment to solve dust and fume problems.



Hoods and Exhaust

No loss of efficiency caused by dust and fumes with these Schmieg hoods and exhaust system for foundry mould conveyor.

what HAPPENS...
TO DUST, FUMES *and* SMOKE
in your plant?

Are they collected completely as soon as they occur, cleaned from the air and quickly disposed of? Before they become a menace to health and a fire hazard, or a cause of lowered employee efficiency?

IF NOT—better consider right now the many advantages of a completely automatic Centri-Merge unit which collects dust, fumes and smoke quick as a flash, washes and scrubs them from the air by high pressure water action for convenient disposal as sludge.

Centri-Merge is the easy and economical air-cleaning system for any plant application. It gives non-fluctuating cleaning efficiency *all the time,* never requires a shutdown for cleaning or routine maintenance during working hours, and is engineered to occupy a minimum of valuable floor space and to save maintenance dollars.

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Schmieg INDUSTRIES INC.
Engineers & Manufacturers

SIGNIFICANCE OF INDUSTRIAL SAFETY AND HYGIENE

TODAY, we all know that if our employees possess sound bodies, peace of mind, and good working conditions, increased efficiency and better products result.

Most managements have ceased thinking of plant people in terms of their working hours only. Every man's work attitude and effectiveness is related to his home, his social environment, his philosophy, his economics, and his happiness. In our company when a man comes to work with us we think of his whole family joining our ranks. How each of the members feels toward the company is important to us. We are trying to rate the confidence and good will of the entire family. To that end, sporadic efforts are of no avail.

We know that a strong safety, medical, and hygiene department is not only something companies owe their people, but that it turns in a profit for stockholders through the development of better human relations.

Owners of a manufacturing plant or foundry want profitable operations. They think in terms of the years ahead, not just today. If experienced in what goes on within plant walls, they know that any plant without adequate medical, hygiene, and safety supervision is heading into trouble. The costs are substantial, but I can unhesitatingly assure any stockholder that our year's earnings are improved by these expenditures.

What a company provides in the way of good industrial medical care, safety and hygiene, makes a pretty accurate gage of the company's sincerity of purpose, both to its employees and to the community. As a prerequisite of sound industrial relations they are here to stay.

The desirability of initiating a program, rather than being forced into it through pressure, is apparent. More and more industrial concerns are setting up these programs as evidence that they are just as essential a part of the organization as any other department.

Recognizing this, no program should be initiated without a definite understanding by all executives as to its being a permanent part of the company structure. Yes, even when the ink is red. You get nowhere if people in supervision think it a trial balloon.

The day the president of a company becomes proud of working conditions he'll be a more effective president. There are many paths to choose from as we try to build better relations within our businesses. Some have clear signs in unmistakable English—"To Better Health," "To Greater Safety."

We must help all in management to know these paths, to know that following them is an obligation to company people, to the community, and to our country. And an obligation to our stockholders. As we follow them there is high personal satisfaction in the realization that we are being of use to other people.

Wm. B. Given Jr.

WILLIAM B. GIVEN, Jr.
Chairman of the Board
AMERICAN BRAKE SHOE CO.

William B. Given, Jr., newly-elected chairman of the Board of Directors and for many years president of one of the world's largest producers of castings, American Brake Shoe Co., is a recognized authority in the field of management techniques and is the author of the recently-published "Bottom-Up Management," published by Harper & Bros., New York. Under his guidance, American Brake Shoe has grown into an organization of some 60 plants located throughout the country and is today a worldwide leader in modern safety and industrial hygiene practices. Born in Columbia, Pa., Mr. Given attended Massachusetts Institute of Technology for a time and graduated from Yale University in 1908. After a brief fling at banking he joined Brake Shoe as secretary to the president in 1911, becoming assistant to the president by 1916, when he left for two years to serve as a Captain with the famous "Fighting 69th." Returning from the war, he was made vice-president and in 1929, president of the company. He was elected chairman of the Board this year.

T. E. Eagan
Chief Metallurgist
The Cooper-Bessemer Corp.
Mt. Vernon, Ohio, and Grove City, Pa.

NOTCH SENSITIVITY OF VARIOUS CAST MATERIALS

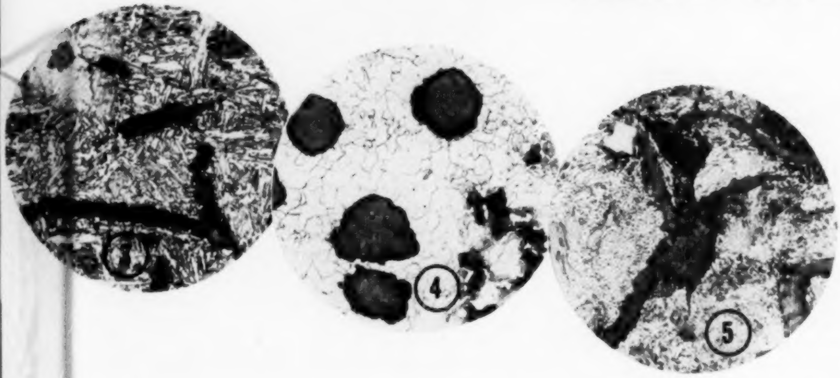


Fig. 1—Microstructure of forged steel material. Etched, 2 per cent nital. X500. Fig. 2—Cast Steel material microstructure. Etched, 2 per cent nital. X500. Fig. 3—Class 70 gray iron microstructure. Etched, 2 per cent nital. X500. Fig. 4—Ductile iron microstructure. Etched, 2 per cent nital. X500. Fig. 5—Microstructure of Class 50 gray iron. Etched, 2 per cent nital.

NOTCH SENSITIVITY under dynamic stress is extremely important from a design standpoint. In consequence it has been the subject of extensive investigation. It has been reported in the literature and summarized by the staff of Battelle Memorial Institute.[1] Since the publication of this book other work has been done, to which references will be made in this article.

From time to time we have conducted fatigue tests, both notched and unnotched specimens, using a 0.050 radius of notch. The materials used for these tests are as follows:

1. Forged steel AISI 1040—This was a piece cut from a forged crankshaft. It was heat treated by water quenching from 1550 F and tempered at 1100 F. The microstructure of the material is shown in Fig. 1.

2. Cast steel—Our specification A-1 calls for ASTM specification A-27 grade 65-30 which calls for minimum physical properties as follows: tensile strength, 65,000 psi; yield point, 30,000 psi; elongation, 20 per cent; reduction of area, 30 per cent. The heat treatment given to the pieces was as follows: 1650 F for 5 hr; air cool; 1250 F for 5 hr; air cool. The microstructure of the material is shown in Fig. 2.

3. Our class 70 acicular gray iron calls for a minimum tensile strength in the casting of 60,000 psi and that the matrix structure of the iron be at least 85 per cent acicular. This type of material is being used in our cast crankshafts. The microstructure of the material used is shown in Fig. 3.

4. Ductile or nodular cast iron—This material is the new magnesium-treated cast iron in which the graphite is in the form of spheroids. There are no standard specifications covering this type of material. The material used for this test was in the annealed condition. The treatment given was: 1650 F for 2 hr; furnace cool to 1250 F, hold 10 hr; furnace cool. The microstructure of the material is shown in Fig. 4.

5. Class 50 gray iron—This is an alloyed gray iron which requires a minimum tensile strength of 50,000 psi in a 2-in. test bar. It is analogous to ASTM specification A-48 class 50 iron. No heat treatment was given the iron. The microstructure of the material is shown in Fig. 5.

It is well known that the strength of cast ferrous metals depends on the chemical analysis and the rate at which they cool from the molten condition to below the Ar_1 transformation points. The cooling rate of castings depends on a number of variables such as pouring temperature, type of sand used, shape of the casting, etc.

In gray iron the strength of any given analysis is profoundly affected by this cooling rate; thus thin sections having quite rapid cooling rates have higher tensile strengths than heavier sections. However, there seems to be a critically slow cooling rate beyond which there is little or no effect on the tensile properties. This is well illustrated in Fig. 6, which shows the tensile strength plotted against section size. For var-

ious ASTM grades of gray iron, it will be noted that the curves tend to flatten as section size increases.

It is not intended to enter into a complete discussion of this condition except to point out that the change in strength of thin sections is quite rapid until a certain critical section (which in the case of simple shapes will have a critical cooling rate) is reached; then the change in strength is much slower. Because castings usually do have complicated shapes and have sections which will be buried in sand it becomes necessary to use such curves as shown with considerable discretion. In other words, it is perfectly possible to have a casting with ½-in. sections which will have a tensile strength equal to a 2- or even 3-in. section, as shown in the chart.

In the case of cast steel this phenomenon is not so pronounced. The cooling rate in the casting influences the dendritic pattern obtained, but as most castings are heat treated the cooling rate during the heat treatment has the greatest influence on the tensile strength obtained. This also applied to forged steel except that forging breaks up the dendritic structure.

All of the above discussion is quite well known, but in the case of obtaining samples for running fatigue tests, the usual practice has been to ignore it and use samples taken from rather small sections. The results obtained are generally used as if they would apply to all sizes and sections of castings. This is not usually the fault of the reporters but rather the user of the results. All of the reporters treat the sampling in detail.

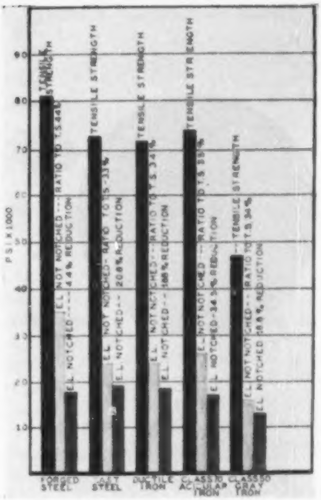
In view of the above condition the specimens for the fatigue tests reported have been taken from large diameter cylinders as follows:

1. Forged steel—9½-in. dia. solid.
2. Cast steel—8¼-in. O.D.x4-in. I.D.
3. Class 70 gray iron—8¼-in. O.D.x4-in. I.D.
4. Ductile cast iron—8¼-in. O.D.x4-in. I.D.
5. Class 50 gray iron—9-in. O.D.x5-in. I.D.

The solid forging was bored out to give a cylinder with a 2-in. wall. The other samples were cylinders with 2-in. wall thicknesses.

Moore and Morkovin[2] have shown that there is a tendency for the endurance limit of steel to become constant for notched specimens 1-in. in diameter or larger. The specimens used for the tests reported here

Fig. 8—Chart showing the effect of 0.50-in. notch on the endurance limits of various metals.



were 1-in. in diameter as shown in Fig. 7. They were tested in reverse bending in a R. R. Moore type fatigue testing machine.

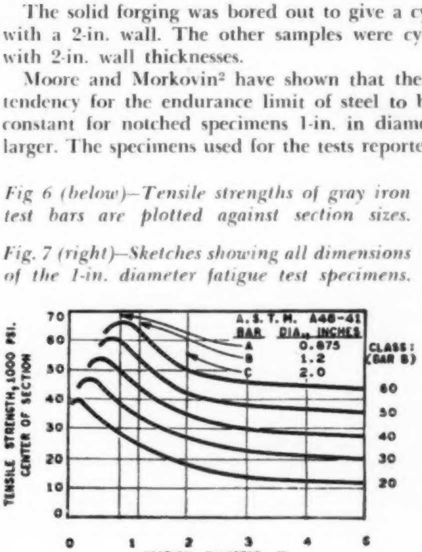
The specimens were machined from segments cut from the cylinders so that the center of the specimen was 1-in. from the O.D. of the cylinder. Tensile bars were taken with their centers in the same location.

It has been well demonstrated that the sharpness of the notch will adversely affect the endurance limit. Hence, most testing has been done with relatively sharp notches. The notch used for this test was one that had a 0.050-in. radius, which could hardly be called a sharp notch. It was chosen because of the fact that we were interested in testing these materials for possible crankshaft application. The ratio of the normal fillet radius used to the diameter of the crankshaft is the same as the ratio of the 0.050-in. notch to the 1-in. diameter test specimen; hence, its use in these tests.

The results of the tests are summarized in Table 1 and are shown graphically in Fig. 8. There are two ways of reporting the effect of the notch, one being to give the per cent reduction of endurance limit due

Fig 6 (below)—Tensile strengths of gray iron test bars are plotted against section sizes.

Fig. 7 (right)—Sketches showing all dimensions of the 1-in. diameter fatigue test specimens.



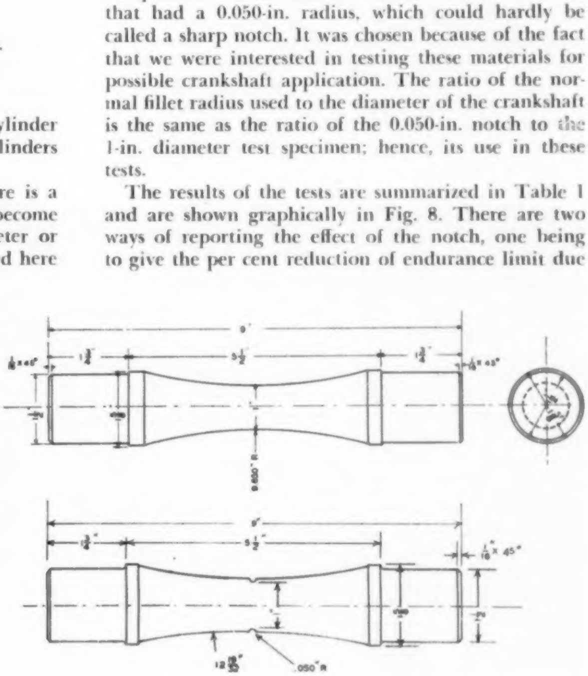


Fig. 9—Macrostructure of one of the cast steel test specimens shows but little porosity and a very large dendritic structure. X1.

TABLE I—RESUME OF NOTCHED AND UNNOTCHED ENDURANCE LIMIT 0.050-IN. NOTCH

	Composition, per cent									
Material	C	Si	Mn	P	S	Ni	Cr	Mo	Mg	Heat Treatment
Forged Steel	0.42	0.31	0.70	0.055	0.037	—	—	—	—	Quenched & Tempered
Cast Steel	0.32	0.45	0.62	0.026	0.032	0.09	0.04	0.06	—	
Class 70 Acicular Gray Iron	2.92	1.43	1.00	0.060	—	2.44	—	1.02	—	
Ductile Cast Iron	3.48	2.15	0.51	0.12	0.008	1.78	—	—	0.08	Annealed
Class 60 Gray Iron	2.88	1.38	0.98	0.078	0.064	1.55	0.37	0.53	—	As-cast

	Tensile Properties					Endurance Limit					
Material	Tensile Strength, psi	Yield point, psi	Elongation, %	Red. of area, %	Brinell Hard.	Unnotched, psi	Notched, psi	Ratio E.L./T.S., Unnotched	Ratio E.L./T.S., Notched	% Red. of E.L. Due to Notch	K*
Forged Steel	80,100	44,600	24.5	32.7	—	35,000	17,800	0.44	0.22	49.0	1.96
Cast Steel	70,750	43,750	18.5	27.2	137	24,000	19,000	0.33	0.26	20.8	1.26
Class 70 Acicular Gray Iron	73,900	—	—	—	—	26,000	17,000	0.35	0.23	34.5	1.53
Ductile Cast Iron	71,500	51,200	8.0	—	170	24,000	18,500	0.34	0.26	18.5	1.30
Class 60 Gray Iron	48,800	—	—	—	216	16,000	13,000	0.34	0.265	18.8	1.23

$^{*}K = \dfrac{\text{Endurance Limit of Unnotched Specimen}}{\text{Endurance Limit of Notched Specimen}}$

to the notch, and the other to give the stress concentration factor K, which is:

$$K = \frac{\textit{Endurance Limit of Unnotched Specimen}}{\textit{Endurance Limit of Notched Specimen}}$$

This factor K seems to be the most popular. In Table 1 both methods are presented. In Fig. 8 the percentage reduction is given.

In the case of the forged steel having a tensile strength of 80,100 psi, the unnotched endurance limit was 35,000 psi, which gives a tensile to endurance limit ratio of 0.44. Comparison of this ratio to those reported throughout the literature shows that within reason it is in agreement. The usual figure for this ratio is between 0.40 and 0.50.

The 0.050-in. radius notch gives an endurance limit of 17,800 psi, which gives a concentration factor K of 1.96, in relative agreement with published data.

Grouping the cast steel, acicular iron, and ductile iron, it is interesting to note that all three of these materials have about the same tensile strength, namely, 71,000 to 74,000 psi.

They also have the same unnotched endurance limit, 24,000 to 26,000 psi, which gives a tensile to endurance limit ratio of 0.33 to 0.35. These same three materials have about the same notched endurance limit, 17,000 to 19,000 psi. The stress concentration factor K, however, is 1.53 for the acicular iron, which is considerably higher than for cast steel 1.26, and nodular iron 1.30.

The ratio of tensile to unnotched endurance limit obtained for cast steel is considerably lower than that obtained by other studies. Sims and Dahle[3] testing six different cast steels made with different melting practices and normalized show this ratio to be between 0.43 and 0.51. However, these investigators used a special keel block coupon which had legs 1⅛-in. thick from which the specimens were machined. *The Steel Castings Handbook*[4] recommends the use of 0.40 for low carbon cast steels. The *Cast Metals Handbook*[5] recommends that this ratio be between 0.40 and 0.50. The ratio 0.33 as reported here is considerably below this figure.

We have no positive explanation for this condition. Several of the test specimens were deep etched. A photograph of one is shown in Fig. 9. No great amount of porosity could be found; however, the dendritic structure as shown is very large and this may be the cause of the low ratio.

J. W. Grant[6] has recently reported some notched fatigue results on acicular cast iron and cerium-treated nodular iron. His specimens were taken from 0.875-in. diameter test bars. The size of fatigue specimen used had a 0.331-in. diameter. He ran his tests with a 45-degree notch having a 0.25-mm root radius and 0.050-in. radius, which is lower than reported here. In the cerium-treated nodular iron he obtained concentration factors between 1.72 and 2.22 for the 45-degree notch, and 1.41 and 1.48 with the 0.050-in. radius notch, which are considerably higher than reported here. It is believed that these extreme differences can be explained by size of specimens and test bars used.

The results obtained in the class 50 gray iron are in substantial agreement with published data with the exception that the tensile strength limit, 0.34, is considerably below the usual figure quoted.

In comparing the last four materials it is interesting to note that due to notch sensitivity the notched endurance limit is between 13,000 and 19,000 psi. Under normal consideration a spread of 6000 psi would be rather insignificant. This is pointed out to show that in many cases any one of these materials could be used interchangeably provided that other considerations in design and foundry practice can be justified.

References

1. *Prevention of Fatigue of Metals*, John Wiley & Sons Co., New York, 1941.

2. H. F. Moore and D. Morkovin, "Second Progress Report on the Effect of Size of Specimen on the Fatigue Strength of Three Types of Steel," ASTM *Transactions*, vol. 43, 1943, p. 109.

3. C. E. Sims and F. B. Dahle, "Comparative Quality of Converter Steel," ASTM *Transactions*, vol. 42, 1942, p. 532.

4. *The Steel Castings Handbook*, first ed., 1941, p. 152, Steel Founders' Society of America, Cleveland.

5. Cast Metals Handbook, 3rd ed., 1944, p. 85, American Foundrymen's Society, Chicago.

6. J. W. Grant, "Notched and Unnotched Fatigue Tests on Flake and Nodular Cast Irons," Research Report No. 251, *Journal of Research and Development*, British Cast Iron Research Association, April, 1950, vol. 3, no. 5.

BUILDING PROJECT FUND TOPS YEAR'S QUOTA IN THREE MONTHS

ANNOUNCEMENT of the A.F.S. Building Project in the September issue of AMERICAN FOUNDRYMAN has proven the signal for prompt response from members of the Society. As a result, the A.F.S. Building Fund, as of November 1, totaled approximately $40,000—well over the goal for the first fiscal year.

In gratifying numbers, individual members, as well as chapters and the Alumni Group of the Society, have expressed their approval of the project in terms of substantial pledges and contributions. The "thermometer" on the following page will report the standing of the Building Fund each month in AMERICAN FOUNDRYMAN until the project is over the top.

Finance & Location Committee Named

A Committee on Finance and Location is now being completed, with Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Michigan, a Past National President of the Society, accepting the chairmanship.

This Committee on Finance and Location, composed entirely of A.F.S. Alumni and men long active in affairs of the Society, will be expected to determine whether A.F.S. should buy and remodel some existing structure, or construct a new building. Since purchase of an existing structure must be paralleled by selection of a location, the committee must also decide whether future A.F.S. Headquarters will be located in Chicago, Cleveland, Detroit or some other locality. Careful study of the advantages and disadvantages will be made by the committee before recommendations are made to the Board of Directors of the Society.

In the event that A.F.S. decides to build a new structure, it has been suggested that a contest be initiated for a building design in keeping with the purposes and functions of the Society. The artist's conception shown in the September issue of AMERICAN FOUNDRYMAN, and a small replica of which appears on the "thermometer" on the opposite page, was the suggestion of one person and will not necessarily be the final design in the event of a building.

Within the committee's province also will be the recommending of additional financing and, if necessary, the decision on when to act and the completion of the campaign to solicit funds for the project. While some have suggested that the building should be financed either by current operating funds of the Society or by borrowing the necessary funds, the A.F.S. Board of Directors believes that the permanent Headquarters should be financed in such a manner as to permit the building of adequate reserve funds during the next three years. However, Building Fund contributions will be maintained intact for the purpose of the Building Project alone.

Beginning with this issue, AMERICAN FOUNDRYMAN will publish regularly the names of individuals, companies, chapters and other organizations contributing to the fund, without stating any pledged amounts, in the belief that those who are back of the project should be recognized by the entire membership. To date, approximately 50 per cent of the pledges received

Looking over an artist's conception of proposed $100,000 permanent home for American Foundrymen's Society during the recent Chapter Officers Conference in Chicago are, left to right: Stanley H. Davis, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. Western Michigan chapter chairman; J. D. James, Cooper Bessemer Corp., Grove City, Pa., vice-chairman, Northwestern Pennsylvania Chapter; A.F.S. National President Walton L. Woody; and A. A. Hochrein, Federated Metals Div., American Smelting & Refining Co., Baltimore, chairman of Chesapeake.

are from individuals, the balance representing company pledges of foundries and supplier organizations, and those of A.F.S. chapters.

The Board of Directors of A.F.S. in formulating the project, is pledged to establish a permanent Headquarters, fulfilling two aims—reduction of the Society's operating expenses, and providing a greater degree of service to the membership and to the foundry industry. Pledges and contributions should be sent to A.F.S. Secretary-Treasurer, 616 S. Michigan Ave., Chicago 5.

Pledges of Individuals

H. C. Aamodt, Great Lakes Carbon Corp., Riverside, Ill.; Carmen L. Adovasic, Ohio Brass Co., Mansfield, Ohio; C. S. Anderson, Belle City Malleable Iron Co., Racine, Wis.; R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.; Eugene J. Ash, Ohio Malleable Iron Co., Columbus, Ohio; Robert Baxted, Bridgeport Brass Co., Bridgeport, Conn.

John W. Bolton, The Lunkenheimer Co., Cincinnati; E. H. Brumley, Brumley-Donaldson Co., Oakland, Calif.; Paul J. Buth, Grede Foundries, Inc., Milwaukee; W. Campbell, T. Mc-Avity & Sons Ltd., St. John, N. B., Canada; Sam F. Carter, American Cast Iron Pipe Co., Birmingham; G. H. Clamer, Ajax Metal Div., H. Kramer & Co., Philadelphia; Joseph J. Clark, St. Joseph, Mich.

Howard G. Close, Machinery & Welder Corp., Chicago; T. A. Davenport, The Budd Co., Detroit, Mich.; E. N. Delahunt, Montreal, Que., Canada; Edwin W. Doe, Brooklyn Technical High School, Belmar, N. J.; Dewey I. Doyle, Jr., Doyle Foundry Co., Grand Rapids, Mich.; Norman J. Dunbeck, Jackson, Ohio; S. W. Duncan, Duncan Foundry & Machine Works, Inc., Alton, Ill.; H. A. Elver, Newport News Shipyard & Dry Dock Co., Newport News, Va.; Werner Finster, West Lawn, Pa.; H. Fruehauf, Bay City Div. Dow Chemical Co., Bay City, Mich.; Benjamin D. Fuller, Rocky River, Ohio; S. L. Gertsman, Government of Canada, Ottawa, Ont., Canada; M. P. Gray, Viking Pump Co., Cedar Falls, Iowa.

John Grennan, Ann Arbor, Mich.; G. M. Guiler, National Malleable & Steel Castings Co., Cleveland; Arthur C. Hintz, Hines Flask Co., Lakewood, Ohio; Albert C. Holler, Twin City Testing & Engineering Lab., St. Paul; Doane K. Hollins, C. D. Hollins Foundry Equipment Co., Chicago; Edwin W. Horlebein, Gibson & Kirk Co., Baltimore.

Charles E. Hoyt, Evanston, Ill.; J. Douglas James, Cooper-Bessemer Corp., Grove City, Pa.; Gordon W. Johnson, Armour Research Foundation, Chicago; E. O. Jones, Belle City Malleable Iron Co., Racine, Wis.; Wier A. Kellogg, National Engineering Co., Maplewood, N. J.; H. W. Kelly, Ohio Foundry Co., Cleveland.

R. E. Kennedy, Wilmette, Ill.; Edgar J. Kihn, Cincinnati Milling Machine Co., Cincinnati; Chas. E. Kirkland, Brillion Iron Works, Inc., Brillion, Wis.; Arthur S. Klopf, Skokie, Ill.; Wayne Kraft, Jr., American Brake Shoe Co., Mahwah, N. J.; S. F. Krzeszewski, American Wheelabrator & Equip. Corp., Mishawaka, Ind.; John A. Kuster, W. & K. Manufacturing Co., Blossburg, Pa.

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H. Louette, Warden King Ltd., Montreal, Que. Canada; Richard Lowry, Steel Sales Corp., Chicago; Frank Madrigal, The Teziutlan Copper Co., S. A., Mexico; Earl Mattox, Electric Steel Castings Co., Indianapolis; J. J. McFadyen, Galt, Ont. Canada; Walter W. Moore, Burnside Steel Fdry. Co., Chicago.

C. W. Morisette, Pennsylvania State College, State College, Pa.; O. J. Myers, Minneapolis; William P. Myers, Induction Steel Castings Co., East Detroit, Mich.; Karl E. Ness, Induction Steel Castings Co., East Detroit, Mich.; J. C. Nevenhoven, Brillion, Iron Works Inc., Brillion, Wis.; Robert V. Osborne, Lakeside Malleable Castings Co., Racine, Wis.; R. W. Parsons, The Ohio Brass Co., Mansfield, Ohio.

Victor Paschkis, Columbia University, New York; Brock L. Pickett, Unitcast Corp., Toledo, Ohio; Lew F. Porter, University of Wisconsin, Madison, Wis.; Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; E. G. Richardson, Delco Remy Div. General Motors, Anderson, Ind.; J. Hermann Ridorossi, Crane Ltd., Montreal Que., Canada.

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Pledges of Companies

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The Babcock & Wilcox Co., Barberton, Ohio; Bellrose Sand Co., Ottawa, Ill.; Beloit Iron Works, Beloit, Wis.; T. H. Benners & Co., Birmingham; Brillion Iron Works, Inc., Brillion, Wis.; Brown Industries, Inc., Sandusky, Ohio; Canadian Pattern & Wood Working Co. Ltd., Montreal, Que., Canada; The Central Silica Co., Zanesville, Ohio; Chicago Spectro Service Laboratory, Chicago; Christiansen Corp., Chicago; City Pattern Foundry & Machine Co., Detroit.

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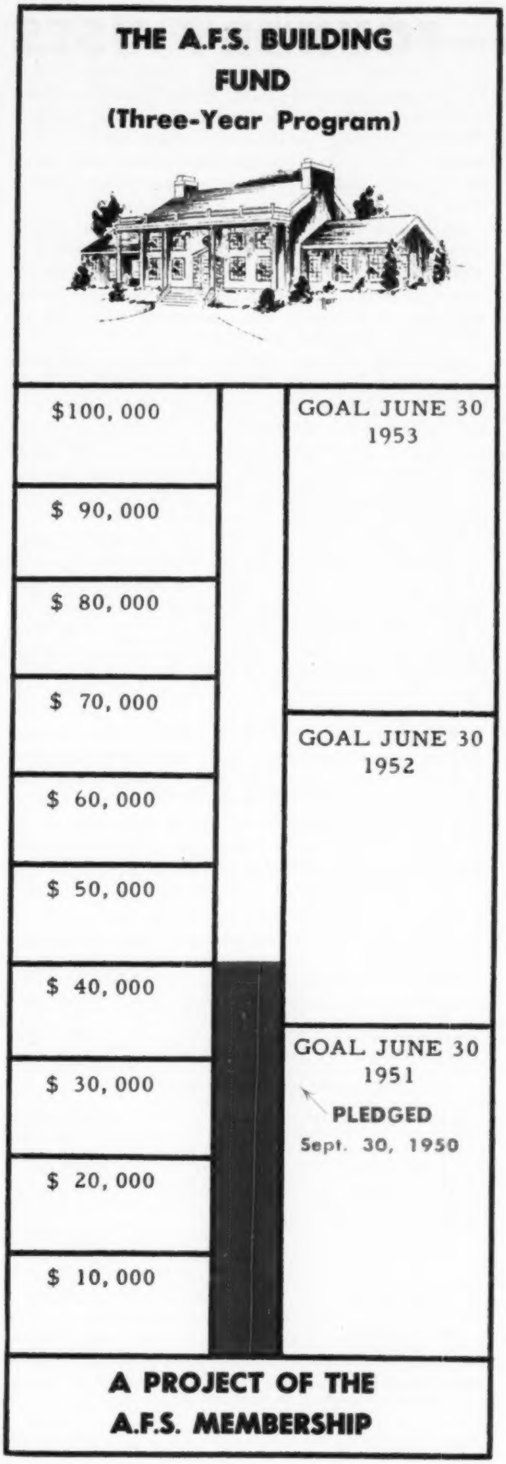
Northern Malleable Iron Co., St. Paul; North Shore Foundry



Co., Waukegan, Ill.; George F. Pettinos, Inc., Philadelphia; The Plainville Casting Co., Plainville, Conn.; Rahn Metals Ltd., North Bay, Ont., Canada; T. Shriver & Co., Inc., Harrison, N. J.; St. Louis Steel Casting Co., St. Louis; Stainless Foundry & Engineering Co., Milwaukee.

Stockham Valves & Fittings Inc., Birmingham; Swayne Robinson & Co., Richmond, Ind.; Taylor—Wharton Iron & Steel Co., High Bridge, N. J.; Utica General Jobbing Foundry, Inc., Utica, N. Y.; Viking Tool & Steel Co., Buffalo, N. Y.; Wells Mfg. Co., Skokie, Ill.; Western Materials Co., Chicago; Wolverine Foundry Supply Co., Detroit.

Pledges of A.F.S. Chapters

British Columbia Chapter, Canton District Chapter, Central Indiana Chapter, Central Ohio Chapter, Michiana Chapter, Mo-Kan Chapter, Northeastern Ohio Chapter.

Northern Illinois—Southern Wisconsin Chapter, Oregon Chapter, Philadelphia Chapter, Rochester Chapter, Southern California Chapter, Tennessee Chapter, Tri-State Chapter.

Board Votes to Waive Dues of A.F.S. Members Who Enter Armed Forces

Recognizing that many young members of A.F.S. may be entering the Armed Forces, the Society's Board of Directors, meeting September 30, has agreed to waive dues of those members who enter the military forces. Thus, the Society is taking the same action it approved in 1942 at the beginning of World War II.

Any member of the American Foundrymen's Society enlisting or drafted for military service is requested to notify A.F.S. Headquarters as soon as definitely called up. His membership will thereafter be maintained without payment of dues until such time as he is released from service. Copies of American Foundryman will be sent him monthly at his designated address or until such time as membership mailings to him may be returned for want of address.

In no event will a member of the Armed Forces be dropped for non-payment of dues. He will remain a member of the American Foundrymen's Society for as long as he is in military service.

Request Nominations For 1951 A.F.S. Gold Medal, Life Membership Awards

Call for nominations of individuals whose contributions to the foundry industry merit consideration of the Board of Awards for awarding of Gold Medals and Honorary Life Membership in the American Foundrymen's Society has been sent to officers and directors of the Society, chairmen and vice-chairmen of A.F.S. technical divisions and general interest committees and to chairmen of the 40 chapters of the American Foundrymen's Society.

Nominations must state fully the name of the individual and the explicit reasons for which he is being nominated and must include complete data on his background only as it pertains to his nomination. Deadline for the acceptance of nominations is December 1.

From the candidates nominated, the A.F.S. Board of Awards, consisting of the last seven living Presidents of the Society, will select those men whom it deems most worthy to be honored by the presentation of A.F.S. Gold Medals or Honorary Life Memberships in the Society at the 55th A.F.S. Convention, to be held in Buffalo, April 23-26, 1951.

PNEUMATIC TOOLS—FOUNDRY USES

APPLICATION OF COMPRESSED AIR to foundry work was almost coincidental with the introduction of machinery in the foundry. In this respect, it is unique. In no instance, can any pneumatic device for foundry service be said to have found its use entirely one of convenience. Each service has a permanent place on the grounds of the economy, work saving, increased production, and improved quality of the foundry product.

The widespread use of pneumatic tools is due primarily to the high power they develop per pound of weight. Lightness of weight, compactness, and flexibility enable pneumatic tools to outperform tools of other types.

The importance of obtaining maximum output from tools of all kinds cannot be overemphasized. This is true because labor is by far the largest item in the total cost of foundry operation. Any reduction in the efficiency of the tools will, therefore, materially increase the unit cost of production.

Pneumatic tool manufacturers have developed tools with a wide range of power and speeds for the many different applications encountered. The selection of the right tool is, therefore, a matter of considerable importance. The original cost of the tools which might be used may be the same, but the resulting output may easily be increased 10, 20, or even 50 per cent by a simple switch to the right tool for the job.

For example, a gray iron foundry was using a small wheel grinder weighing 2¾ lb, with a 1¾-in. cone, to clean up exhaust manifolds. The substitution of a smaller, lighter, faster tool, weighing 1⅛ lb, taking the same wheel, increased production 25 per cent. This increase was obtained because of the ease of handling the smaller and lighter tool.

Left, top to bottom—Fig. 1—Heavy duty vertical grinder operating flared cup wheel at high speed. Cutting action is rapid and general finish is smoother than with grinders using straight-sided wheels. Fig. 2—One of the many types of cone grinders, this tool carries a 2¾-in. diameter cone operating at 8,500 rpm with fast cutting action and high wheel life. Fig. 3—Straight grinder operating at 6,000 rpm with a 6-in. wheel.

Type of Wheels	Vitrified Wheels			Elastic or Organic Bonded Wheels		
	Soft FPM	Medium FPM	Hard FPM	Soft FPM	Medium FPM	Hard FPM
Type 1 Straight Wheels	5500	6000	6500	6500	8000	9500
Type 6 Cup Wheels	4500	5000	5500	6000	7500	9000

This means that wheels must not revolve faster than—

Type 1 Straight Wheels	Vitrified Wheels	Elastic or Organic Bonded Wheels
1¼ inch diameter	21,000 RPM	
1½ inch diameter	16,000 RPM	24,000 RPM
2 inch diameter	12,000 RPM	17,000 RPM
2½ inch diameter	9,500 RPM	14,000 RPM
2¾ inch diameter	8,500 RPM	13,000 RPM
4 inch diameter	6,000 RPM	9,000 RPM
6 inch diameter	4,100 RPM	6,000 RPM
8 inch diameter	3,100 RPM	4,500 RPM
Type 6 Cup Wheels		
6 inch diameter	3,500 RPM	5,000 RPM

Note: 6-inch hard grade cup wheels may be used at 5500 RPM only where specifically recommended by the manufacturer.

Fig. 4—Grinding wheels—approved peripheral speeds.

Specifications for Chipping Hammers

Piston Stroke	Piston Diameter	Length	Weight	Hose	Work Adapted For
Inches	Inches	Inches	Pounds	Inches	
1	⅝	8	3	½	Very light chipping
1⅜	¾	10	5½	½	Light chipping and scaling
1	1⅛	11¼	10	½	Aluminum casting and light cast iron caulking
2	1⅛	13½	13¼	½	Heavy cast iron; light steel casting; flue beading
3	1⅛	14½	14½	½	Heavy steel casting; billet chipping
4	1⅛	15¾	15¼	½	Extra heavy chipping

The above is a composite table of all manufacturers' most popular sizes.

Fig. 5—Data for types of foundry chipping hammers.

In another case, an operator was using a straight-type 6-in. air grinder to make machine bases flat and smooth. The job was changed over to a vertical cup-wheel grinder which has a vertical spindle at right angles to the horizontal face of the work. The tool is held by two handles 90 degrees apart.

The result was the doubling of output because the flared cup-wheel contacted a larger area and made it easier to finish the high spots flush with other metal. At the same time the appearance of the metal was improved because the flat wheel ground smooth and did not dig grooves (Fig. 1).

In analyzing the proper selection of the portable air tool, it will pay the individual foreman to try a variety of wheels on a given 6-in. job, keeping track of the time, of metal removed, and comparing it with the wheel cost. Any wheel which cuts faster than another wheel may be justified, even though the life is shorter, because the cost of the wheel per minute is a small item compared to the labor and overhead.

Selecting Accessories

The accessories to be used with a tool must be selected as carefully as the tool itself. Tool manufacturers can readily supply the necessary information for many kinds of work, but for special applications only experimentation will reveal the one best accessory and machine to use. Once this is determined, increased production and easy operation continue automatically.

Illustrations show correct applications of modern pneumatic abrasive tools fitted with proper accessories to increase output and satisfy safety conditions.

Cone Grinding Wheels: Cone wheels are available in various sizes, grits, and grades and should be operated at the maximum permissible speeds in order to obtain maximum efficiency. Cone wheels should be accurately balanced to avoid vibration (Fig. 2).

Cup Grinding: Cup wheels may be straight or flared type, the latter being used for getting into corners or descaling welds. Elastic bonded types are generally preferred. Particular care should be given to operating cup grinding wheels within safety code speed limits as shown in the accompanying chart.

Straight Grinding Wheels: In general, the use of elastic bonded wheels operating at peripheral speeds of 9500 fpm rather than vitrified wheels which are limited to 6,500 fpm will increase production. The output of specific grinding wheels should be evaluated against the rate of wheel wear in order to obtain maximum metal removal and desired finish with a minimum wheel replacement cost (Fig. 3).

Fig. 6—Bench type pneumatic sand rammer. Weight of tool, 14 lb.

Specifications for Sand Rammers

Piston Stroke	Piston Diameter	Length	Butt Diameter	Weight	Hose	Work Adapted For
Inches	Inches	Inches	Inches	Pounds	Inches	
2	1	13	2	7	½	Bench work
4	1	20½	2½	12¾	½	Bench work
5	1¼	49	3	21½	½	Floor work
6	1½	49	5¾	31	½	Heavy floor work and backfill tamper

The above are average, or composite, specifications of all manufacturers' most popular sizes.

Fig. 7—Bench and floor type sand rammer specifications.

For rapid grinding, maintenance of high rotative speed under load is essential. Hand-held portable pneumatic grinders uniquely meet this condition because they develop the high power required with minimum weight. The free speed of modern air tools is usually limited by an automatic governor, set to permit the maximum allowable peripheral speeds for various types of grinding as defined in *Use, Care and Protection of Abrasive Wheels,* American Standards Association. The standards recommend peripheral speeds for grinding wheels as expressed in the table (Fig. 4).

Some of the other tools used in the foundry, chipping hammers, scaling hammers and sand rammers are percussion tools. They operate at highest efficiency with compressed air at 90-lb pressure. If the pressure of the tool drops to 80 lb, the output of the tool drops about 17 per cent, and if the pressure drops to 60 lb, the output drops about 50 per cent.

Chipping hammers are classed as heavy duty, medium or light. The accompanying table (Fig. 5) shows the many types available.

Sand rammers are of two types, the bench rammer for light mold and core work, and the floor type for heavy flask ramming and built-up molds (Fig. 6).

While originally sand rammers were used principal-

Fig. 8—A trolley arrangement for handling the air hose permits the air hoist to serve a large foundry area.

ly to save work, their years of service have brought to the fore another outstanding fact—a decided improvement in the quality and uniformity of castings when molds are air rammed. Specifications for sand rammers are given in (Fig. 7).

Air-operated hoists are another family of pneumatic equipment which has wide and effective application in foundries. The air hoist affords smooth, graduated control, and is easy to operate and maintain. The method of handling the air hose to the hoist is extremely simple (Fig. 8).

Like other machinery, the satisfactory operation of a pneumatic tool is largely dependent upon the care it receives. Pneumatic tools are high-speed machines, and it is reasonable to expect that wear will occur in time, especially on such parts as pistons, valves, throttles, vanes, bearings, etc. The rapidity of wear will largely depend upon the attention paid to lubrication, cleaning, and general maintenance.

All manufacturers of pneumatic tools provide for suitably lubricating the various parts of such machines. Instruction tags accompany the tools, and it is a good plan to study the instructions carefully before starting work. It is almost impossible to lay down any hard, fast rules on the care and operation of pneumatic tools, but observance of the following suggestions will insure more and better work and longer tool life:

1. All tools should be cleaned and oiled before being put in operation. Pipe lines should be blown out before connecting tools.
2. Use a good grade lubricant.
3. Use filters and strainers wherever possible.
4. Inspect all tools and see that they are tight.
5. Operators should hold hammers firmly against the work. If the die or chisel is permitted to play in and out of the hammer, it will result in damage to the tool.

In addition to the foregoing suggestions regarding care and operation, users of pneumatic tools are urged to follow recommendations of the manufacturers.

Note: Data and photographs for this article were furnished by Compressed Air and Gas Institute.

Submit 1951 Convention Papers Early

Authors of technical papers expected to be presented at the 55th Annual A.F.S. Convention—Buffalo, April 23-26—should plan now to meet the December 15, 1950, deadline

Papers in manuscript form should be sent in duplicate as soon as possible to the Technical Director, American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill. Manuscripts will be forwarded to the appropriate committee for review and possible scheduling for the 1951 A.F.S. Convention.

Intent to submit a paper can be indicated on the Offer of Technical Paper forms available from the Technical Director. Copies of the A.F.S. Guide to Authors are available on request.

Acceptance of a paper for the Convention contemplates its publication as a preprint, its presentation at the Annual Meeting followed by publication in Transactions. Some papers submitted may be published in American Foundryman.

FOUNDRY BLACKSMITH DEVISES SIMPLE NEW ROD BENDING TOOL

Simple and compact, the rod bending tool shown in the accompanying photographs was devised by Erwin Neutzel, a blacksmith in Allis-Chalmers Mfg. Co.'s No. 1 Foundry, Milwaukee, to facilitate bending of 1/4 in. rods. Mr. Neutzel's device consists of a 1/2-in. pipe on a stationary hinge form. Pipe serves as a lever for bending 18-in. long rods used for front support cores and is fastened to stationary form by means of a pin, so that it can be readily removed when not in use. Form has holes to permit bending five rods at a time—all at a uniform angle. Previously, rods were bent singly in form anchored to bench.

NEW ENGLAND FOUNDERS BRUSH UP ON TECHNOLOGY AND MANAGEMENT

SHELL MOLDING, cupola practice, sand, costs, personnel, and better methods made up the program for the 10th New England Regional Foundry Conference held October 27-28 at Massachusetts Institute of Technology, Cambridge. Sponsored by the New England Foundrymen's Association and Massachusetts Institute of Technology, the conference was under the chairmanship of Frederick M. Fitzgerald, Draper Corp., Hopedale, Mass., with Thomas I. Curtin, Waltham Foundry Co., Waltham, Mass., as vice-chairman. Program chairman was Stanley E. Tims, Saco-Lowell shops, Biddeford, Maine.

The conference opened the afternoon of October 27 with an address of welcome by Thomas K. Sherwood, MIT dean of engineering. He complimented the foundry industry for its remarkable appreciation of the place of engineering schools in the educational scheme, adding that their purpose is to train in fundamentals, not trade practices. Mr. Fitzgerald presided.

Prefers Price Per Piece

At the first technical session, Earl H. Bradley, Builders Iron Foundry, Providence, R.I., introduced John L. Carter, Gray Iron Founders' Society cost consultant, Newark N.J., whose topic was *"Foundry Costs."* The three-fold purpose of a good cost system is to provide information for cost estimating, cost control, and profit analysis, said the speaker. He illustrated a simple and an advanced method for estimating the cost of producing a casting. Flat prices were abandoned years ago by progressive foundries, he declared, in favor of selling by the piece instead of the pound.

A good cost control system requires, said Mr. Carter, a cost conscious management, detailed information broken down by departments (melting, molding, core making, and cleaning and shipping), and availability of reports by the tenth of the month followed by immediate study and conference with supervisors.

Stresses Motion Time Analysis

"Better Methods Applied to Foundry Operations" was the subject of the second technical session. Speaker was Norman J. Henke, Central Foundry Div., General Motors Corp., Saginaw, Mich., who described the elements of motion time analysis, and showed with the assistance of William McCarthy of the GMC Saginaw Malleable plant, how foundry operations can be improved through simple changes in facilities and work routine. Leroy M. Sherwin, Brown & Sharpe Mfg. Co., Providence, was chairman of the meeting.

With Mr. Henke giving the commentary, Mr. McCarthy demonstrated two core room operations before and after work simplification while members of the audience timed him by stopwatch. The first example showed core filing and dipping with simultaneous inspection being performed unbalanced with the left hand doing most of the work. An improved layout of the work area and an inexpensive fixture to enable the operator to perform a balanced operation with both hands working together resulted in a 90 per cent increase in productivity without any increase in effort.

The second demonstration showed a coremaking operation as it was performed prior to motion time analysis. Using the old method, Mr. McCarthy made sand cores in a four-cavity box on a bench that was too low, with sand stored below the level of the box. The set-off for the plate required stepping back and to the side for dumping cores and the operation was unbalanced with the right hand doing too much work.

Make Simple, Inexpensive Improvements

A less fatiguing operation with a 62½ per cent improvement in production resulted when the bench was raised four inches to a convenient 36 in. working level, with sand supply above the level of the box, and better location of the set-off which made it accessible to the operator without changing position. Other improvements included balancing the work by locating the rammer on the right, strike off on the left, and wires in the center where they could be reached and inserted with both hands.

The demonstrations were followed by a motion picture showing examples of work simplification, before and after, installed in General Motors foundries at little cost and applicable in all types of foundries.

Attendants at the conference dinner ending the first day's meetings, heard Paul Swaffield discuss *"Football as the Referee Sees It"* through the courtesy of Mystic Iron Works. Prior to this inside story on football, Frederick M. Fitzgerald, who was presiding received a rising vote of thanks for his chairmanship of the conference, on call by Thomas I. Curtin.

Decries Careless Sand Practice

Leading off the second day of the conference was Charles B. Schureman, Baroid Sales Div., National Lead Co., Chicago, who spoke on *"Foundry Sand."* In the choice of a base sand, he said, casting finish is the determining factor. The coarsest constituent governs the finish, the finest constituent the permeability. Choice of a clay depends on whether the foundryman wants durability, a good collapsibility, or high dry and hot strength, or a combination, he stated. Mixing can be done successfully only with a batch type mixer according to the speaker.

Warns Against Inaccurate Mixes

Bad practices he had observed, given by Mr. Schureman, included: use of shovels, damaged pails and cans, and broken bottles, for measuring binders; reduction in mixing time to increase production; operation of the sand mixer by an inexperienced man; poor maintenance of mixing equipment; and variation in moisture content of the base sand which causes variations in the amount of sand measured. He warned against assuming that properties determined at the sand mill are the same as properties in the mold. The moisture content is very important, he said, while the signifi-

cance of permeability is overrated. Expansion, which causes the worst foundry trouble, can be compensated for through better grain distribution, moisture and ramming control, and use of organic materials, the speaker declared.

The speaker stated that use of hot sand should be avoided and recommended that sand and pattern should be at approximately the same temperature during molding. Chairman of the sand session was Fred Clark, Whitehead Brothers Co.

Background on Shell Molding

History and current state of development of shell molding were reported by Bernard N. Ames, New York Naval Shipyard, Brooklyn, in his talk *"Plastic Bonded Sand Molds."* Presiding at this session was Raymon F. Meader, Whitin Machine Works, Whitinsville, Mass. The process of making shell molds was introduced to this country through FIAT Final Report 1168 prepared for the U.S. Office of Military Government for Germany by William W. McCulloch, American Cast Iron Pipe Co., Birmingham, Ala., the speaker said. Advantages claimed for the method include an improvement in foundry working conditions, a four-to six-fold production increase for the same area and personnel, superior casting finish, precision, and substantial reduction in cleaning.

In the work at the shipyard, sand of A.F.S. fineness from 90 to 150 was mixed with six to nine per cent of a phenolic resin, the latter containing approximately 10 per cent of hexamethylenetetramine as an accelerator. Spread on a hot metal pattern (360-400 F) sprayed with a release agent (15 per cent of a silicone jelly in methyl ethyl ketone), the mixture softens and in a few seconds builds up to approximately one-eighth of an inch in thickness. Pattern plate and shell are cured at about 600 F for two or three minutes to form the finished mold half.

Assembled and backed by shot or sand, the shell molds are poured by ordinary pouring methods. Illustrations of polished, macro-etched test pieces shown by Mr. Ames indicated that the shot does not chill the metal as much as green sand because of the insulating effect of the shell.

Common Sense in Cupola Operation

Afternoon sessions the second day featured T. E. Barlow, Eastern Clay Products, Inc., Jackson, Ohio, speaking on *"Cupola Practice,"* and Ralph L. Lee, General Motors Corp., Detroit, whose topic was *"Humanics."* Joseph B. Stazinski, General Electric Co., West Lynn, Mass., was chairman of the early afternoon meeting; Stanley E. Tims, presided at the second session on October 28.

Good cupola operation merely means application of common sense, said Mr. Barlow, as he gave as examples of poor practice (1) making out the melting record before instead of during or after a heat, (2) poor maintenance of blowing equipment and allowing air intake to become clogged, (3) poor care of cupola control equipment, and (4) blind dependence on instruments.

Mr. Barlow favors intermittent tuyeres with an intermittent overhang (bosh over the tuyeres only). This, he said, prevents slag from forming a continuous ring and the cupola is easier to keep clean. If the overhang is kept about six inches above the tuyeres the slag will not be so readily cooled by the blast, he explained. The overhang should not reduce the cross-section of the cupola by more than 15 per cent.

Contour patching is the preferred method of maintaining a cupola lining, according to the speaker. Using this technique, the foundryman allows the lining to assume its own shape under operating conditions, patching only to retain this burned-out shape rather than lining the walls cylindrically. By allowing the cupola lining to remain thinner in the hot zone, said Mr. Barlow, the heat transfer there is more rapid and excessive burning out of the refractory lining is avoided. Air placement of a ganister lining is especially convenient, he stated, with patching material being put on at the rate of 80 to 250 pounds a minute. Such lining has superior resistance to burn out and slag erosion, he declared.

Stresses Recognition and Respect

The difference beween how hard people do and can work is largely determined by their feeling toward their job, their boss, and their company, according to Mr. Lee, and these are governed by the accumulated impressions gained in their daily contacts with the people they work with and for. If the behavior of those who guide their efforts evidences honest and sincere appreciation and respect for the best efforts put forth, then regardless of relative skill, talent, or replaceability, the resultant feeling is likely to be the biggest factor in the quality and quantity of the work turned out.

After the conference, representatives of supply and equipment companies sponsored a smoker.

Members of the Conference Arrangements Committee, in addition to Messrs. Fitzgerald, Curtin, and Tims, were: Frank Elliott, Westinghouse Electric Mfg. Co., Springfield, Mass.; Gordon Paul, Brown & Sharpe, Providence, R.I.; Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.; Joseph B. Stazinski, General Electric Co., Lynn, Mass.; Robert Walker, Whitin Machine Works, Whitinsville, Mass.; Henry Stenberg, Draper Corp., Hopedale, Mass.; Clyde Armstrong, Warren Pipe & Foundry Co., Everett, Mass.; Louis G. Tarantino, Niagara Falls Smelting & Refining Co., New Haven, Conn.; A. S. Wright, Springfield Facing Co., Springfield, Mass.; Prof. Howard F. Taylor, Massachusetts Institute of Technology; Dr. Walter M. Saunders, Providence; Jack Orrok, Debevoise-Anderson Co., Boston; and Harry Impey, Boston.

Registration and reception were handled by C. A. Wyatt, Debevoise-Anderson Co., and Herbert H. Klein, Klein-Farris Co., Boston.

Schedule Sand School At Navy Pier

SAND SCHOOL put on by the Harry W. Dietert Co., Detroit, will be held in Room 218, University of Illinois, Navy Pier Branch, Chicago, the evenings of November 27 through 30. Hours are 6:00 to 9:00 p.m. Open to all foundrymen at no charge, arrangements are under the supervision of Prof. R. E. Kennedy, secretary emeritus of A.F.S. An attendance of over 200 is expected to attend the four sessions.

FUME CONTROL—ELECTRIC MELTING FURNACES

J. M. Kane* and R. V. Sloan*
American Air Filter Co., Inc.
Louisville, Ky.

THE SERIOUS EFFORT of Los Angeles County to clear its smog conditions has made that area a proving ground for control methods and for air cleaning equipment. Studies for many processes have indicated amount of contaminant released, its nature and particle size. Pilot plant installations have demonstrated the degree of control that can be expected at economical first cost, and with reasonable operating and maintenance expense.

The fumes from electric melting furnaces in the steel foundry industry present a typical history of how such problems can be investigated and solved. During the melting cycle varying quantities of fumes are released, with the concentration visually heavier during the early melt-down period and during the boil and refining portion of the cycle. Fume concentration will also be a function of the scrap charged, with the more heavily oxidized and the oilier materials producing the greater concentrations.

Fumes are released from around the electrodes, the charging door and the pouring spout, escaping to the melting room as shown in Fig. 1. Exhaust ventilation by propeller fans in the roof monitors has been accepted practice of keeping the fumes from filling the foundry working area. Exhaust volumes of 60,000 to 100,000 cfm to induce the discharge of these products to the atmosphere have been common.

Installation of collection equipment for exhaust volumes of this magnitude would involve prohibitive equipment cost and high operating expenditures. It became apparent that some system whereby fumes were confined to smaller exhaust volumes would be necessary to make fume collection practical.

*Chief Engineer, Dust Control Div., and Los Angeles representative, respectively.

1 J. M. Kane, "The Application of Local Exhaust Ventilation to Electric Melting Furnaces," A.F.S. TRANSACTIONS, vol. 52, pp. 1351-1356 (1944).

Such a system employing local exhaust ventilation principles had been developed[1] and introduced to foundry practice in 1937, primarily to provide more positive fume removal from the melting room and better visibility for the crane operator. Such a hood is attached to the furnace roof ring, exhausting the fumes at the points of generation (Figs. 2 and 3). Exhaust volumes can be reduced to 10 to 15 per cent of the volumes required by general ventilation methods.

The furnace tested in the Los Angeles investigation was a 3-ton, side-charge, acid furnace operated on a 2-hr cycle with charges of approximately 7500 lb. Test No. 2 used heavily oxidized scrap from the bottom of the scrap pile and represents the heavier loadings that could be expected under poorer scrap conditions. Furnace was equipped with hood exhausting fumes from charging door and around electrodes. Pouring spout was plugged so that no escapement occurred at this point.

Essential data from four tests conducted during four complete 2-hr melting cycles are tabulated in Table 1. Dust loadings in exhaust gases varied with the point in the melting cycle, with the heaviest loading occurring during the boil and refining cycle. Variation in loadings of the above four tests are shown in Fig. 4.

Samples taken periodically during the test runs were checked with the electron microscope, and it was indicated that approximately 95 per cent of all particles were less than 0.5 microns, with practically no particles above 2 microns. Agglomerating tendency of the material, however, was pronounced.

A local exhaust wet type dust collector was installed

Fig. 1—Typical smoke and fume release from steel foundry electric melting furnace. Fig. 2—Fumes are confined by local exhaust hoods on roof ring and exhausted material removed by wet type dust collector located, in this instance, on transformer room roof. Fig. 3—Spring loaded flange joint in exhaust duct allows furnace to tilt for pouring or slagging operations.

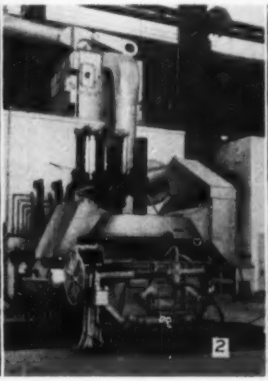


Table 1—Solids in Electric Furnace Gases

Test No.	1	2	3	4
Charge, lb	7471	7557	6559	7462
Solids in stack, gases, lb	16.0	28.4	19.1	21.4
Solids/ton charged, lb	4.5	7.5	5.8	5.7

for the two 3-ton furnaces, one acid and the other basic, and guaranteed to meet solids removal requirements of the Air Pollution Control Board. (With a process weight of 3750 lb/hr/furnace, maximum permissible escapement would be 5.77 lb/hr for one furnace in operation; 8.39 lb/hr for both furnaces.)

Test data during a 97-min period, including the boil and refining periods of both furnaces, indicated a loss from the exhaust system discharge of 3.35 lb/hr as compared with an allowable 8.39 lb/hr. Collection efficiency of a dust collector is defined as the ratio of the weight of material collected to the weight of a material entering the exhaust system, and can be calculated from the above data.

Average loading from one furnace during the earlier tests 1, 3, and 4 was approximately 9 lb/hr, which translated to the "on" time of both furnaces during 97-min test period would equal a total loss of 21 lb. Reduction of this loss to 5.59 lb for the test period indicated a probable local exhaust collection efficiency of 73 per cent.

To verify above conclusions, simultaneous sampling at inlet and discharge of exhaust system was made during an 81-min test. The basic furnace contained a 5300-lb charge of manganese steel, and the acid furnace a 5000-lb charge of carbon steel. Boil and refining periods for both furnaces were included in the tests run.

Data and results obtained during this test are shown

Table 2—Test Data for Local Exhaust System

	Exhaust Inlet	Exhaust Outlet
Duration of test, min	81	81
Flow volume through duct, cu ft	695,500	689,000
Volume sampled, cu ft	231	262
Weight material collected, grams	1.643	0.506
Concentration, lb/hr	8.6	2.35

$$\text{Efficiency} = \frac{8.6 - 2.35}{8.6} = 72.7\%$$

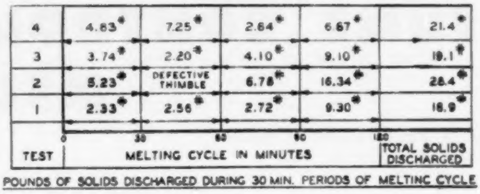


Fig. 4—Variations in dust loadings of the four tests.

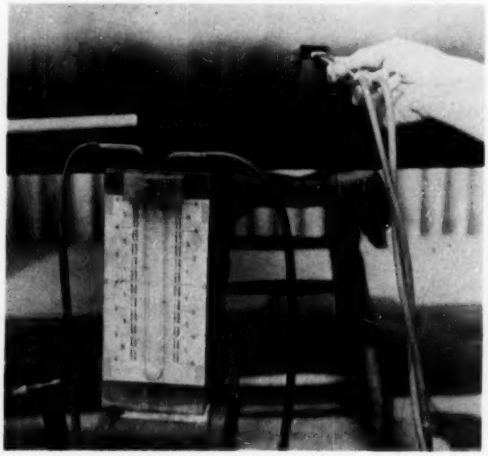
in Table 2. This efficiency of 72.7 per cent confirmed estimates on effectiveness of exhaust system deduced from previous test data.

Much of the data was obtained by the Steel Founders' Society committee through the active assistance of Alloy Steel and Metals Co., Los Angeles, and Robert Francis of that company. Collection efficiency and dust loadings were then checked at a Midwest steel foundry. During the two test periods reported in Table 3, the top-charge furnace was melting 12,000-lb charges to produce SAE 1045 or 1025 steel.

Sampling equipment (Fig. 5) consisted of ⅜-in sampling tubes located in the inlet and outlet ducts of the exhaust system. The velocity and volume of gases in the ducts at the sampling points were determined by pitot tube traverses (Fig. 6). Samples were pulled through the tubes simultaneously at velocities approximately equal to the velocities in the ducts by means of a vacuum pump or compressed air operated Hancock ejectors. The samples passed through Whatman extraction thimbles which act as absolute filters to remove all entrained solids.

These thimbles were dried to constant weight before and after each test, and the difference in weight was the material collected at each sampling point. The

Fig. 5 (below, left)—Equipment used for measuring velocity and volume of duct gases. Fig. 6 (below)—Sampling equipment employed in the tests included: (A) Whatman extraction thimble; (B) means for measuring volume of gas sampled; (C) vacuum pump.



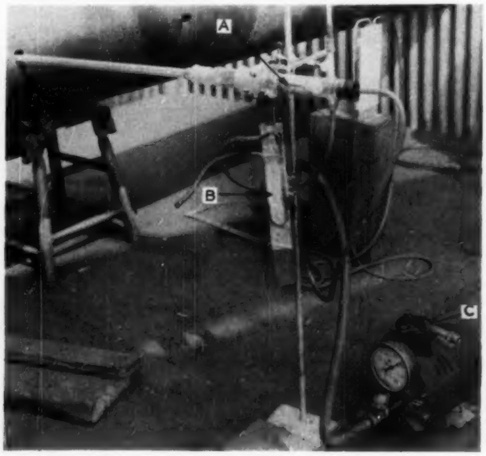


TABLE 3—TEST DATA FROM 6-TON CHARGES IN ELECTRIC MELTING FURNACE

	Test No. 1		Test No. 2	
	Inlet	Outlet	Inlet	Outlet
Duration of test, min..	140	140	120	120
Flow volume through duct, cu ft.........	1,820,000	1,820,000	1,680,000	1,680,000
Volume sampled, cu ft	83.4	112.1	70.5	99.0
Avg. loading during complete melting cycle, grains/cu ft..	0.356	0.08	0.346	0.065
Solids during melting cycle, lb/ton charged	15.3	3.46	12.75	2.42
Efficiency, %	77.6		81.2	

volume of gas sampled was determined for each tube by observing the pressure drop across a calibrated orifice located in the sampling kits after the extraction thimbles. By knowing the volume of gas sampled, the volume of gas handled and weight of entrained solids collected, the total weight of entrained solids entering and leaving the exhaust system was determined as given in Tables 2 and 3.

Gage of discharge density by the Ringleman Chart method does not lend itself to accurate readings, as would be expected of this method designed as a gage for smoke density from coal burning gases of combustion. Densities of the order of No. 2 Ringleman or more (50 per cent obstruction to the passage of light) occur without dust control equipment; densities under No. 1 Ringleman (20 per cent obstruction to the passage of light) were obtained at all times with the local exhaust system in operation.

Conclusion

From this study, emission of solids of the order of 5 to 8 lb/hr/ton of metal melted can be expected from electric melting furnaces in steel foundries. Particle size of solids, primarily ferric and ferrous oxides with some silicon dioxide, are 95 per cent less than 0.5 microns.

Reduction of this quantity by about 75 per cent can be obtained with good wet dust collection equipment. With the confinement of escaping solids from the furnace through local exhaust ventilation methods, total exhaust volumes can be reduced to quantities making cost of collection equipment feasible.

NATIONAL DEFENSE THEME OF FEMA MEETING

MOBILIZATION, government controls and current business conditions as they affect the foundry and foundry equipment industries were dominant themes at the 32nd Annual Meeting of the Foundry Equipment Manufacturers' Association, held October 12-14 at the Greenbrier, White Sulphur Springs, W. Va.

Highlights of the three-day meeting were a symposium on mobilization and the Washington scene, an open forum on the status of the foundry equipment industry, and election of officers for 1950-51. Luncheons, an annual banquet, president's reception and golf tournament were social features of the meeting.

Officers of the Association elected for 1950-51 were: *president*, C. V. Nass, Pettibone Mulliken Corp., Chicago; *vice-president*, Aubrey J. Grindle, Whiting Corp., Harvey, Ill.; *executive secretary and treasurer (reelected)*, Arthur J. Tuscany. *Directors to serve three-year periods*: Wayne Belden, Ajax Flexible Coupling Co., Inc., Westfield, N. Y.; E. A. Borch, National Metal Abrasive Co., Cleveland; and Leon Miller, Osborn Mfg. Co., Cleveland.

Opening the meeting on Thursday morning, October 12, were product group sessions on Policy, Molding Machines, Dust & Fume Control, Flask Manufacture, Blast Cleaning & Tumbling; Furnace, Cupola and Ladle; and Material Handling and Processing.

Friday's sessions opened with words of welcome from Retiring FEMA President John Hellstrom and FEMA Executive Secretary-Treasurer Arthur J. Tuscany. Principal feature of the day was a *"Symposium—the Washington Picture,"* with Thomas Kaveny, Jr., presiding and F. G. Steinebach, Penton Publishing Co., Cleveland, reporting on *"Developments in the Washington Scene."* L. C. Wilson of Reading, Pa., outlined *"Pertinent Facts on Mobilization of the Foundry Equipment Industry."*

Following this, A. F. S. National President Walton L. Woody spoke on such *"Subjects of Joint Interest"* to both the American Foundrymen's Society and FEMA as the A.F.S. long-range, industry-wide Safety, Hygiene and Air Pollution program and the A.F.S. campaign for a permanent American Foundrymen's Society Headquarters.

Final sessions of the three-day meeting, held Saturday morning, October 14, opened with an *"Interpretation of FEMA Business Trend Reports"* by Chairman E. A. Borch of the Statistical Committee. Highlight of the program was an open forum on *"Rate of Activity in the Foundry Equipment Industry,"* with FEMA President-Elect C. V. Nass reporting on activities of the National Castings Council.

Non-Ferrous Casting Tonnage Up 30 Per Cent: NFFS Annual Meet Told

SUBSTANTIAL INCREASE in demand for both copper-based and aluminum based alloys was reported at the Annual Meeting of the Non-Ferrous Founders' Society, held in Boston on October 13, 14 and 15.

The nationwide pattern shows a casting tonnage increase of from 30 to 35 per cent over last year, apparently caused by demands for defense contracts.

A discussion of the role of trade associations in the nation's defense program by Lieut. Commander Clarence Cisin was a meeting highlight. Other topics discussed were present and future government controls and NFFS's proposed presentation of complete industry cost controls in keeping with government directives and control orders.

Newly-elected officers are: *president*, J. D. Zaiser, Ampco Metals, Inc., Milwaukee; *vice-president*, W. H. Durdin, Dixie Bronze Co., Birmingham; *2nd vice-president*, Robert Langsenkamp, Langsenkamp, Wheeler Brass Works, Indianapolis. New directors are Raymond E. Bietry, B & S Foundry, Brooklyn; Mr. Langsenkamp, and L. G. Smith, Lakeside Bronze, Inc.

TEXANS COVER FOUNDRY FIELD AT FIRST REGIONAL CONFERENCE

Texas chapter held its first regional foundry conference in San Antonio, October 5 and 6, with a well-rounded program of ten technical sessions, three round table luncheons, a banquet, a special luncheon, a Texas barbecue, and a program for the ladies. Featured speaker at the luncheon the first day was A.F.S. President Walton L. Woody, National Malleable & Steel Castings Co., Cleveland, while Dr. Harold Vagtborg, Southwest Research Institute, was principal speaker at the banquet which concluded the two-day program. All sessions were held in San Antonio's Plaza Hotel. Co-sponsor of the conference with the Texas chapter was the A.F.S. student chapter of Texas A & M College.

Following registration, the conference opened with Harry J. Jacobson, Industrial Pattern Works, Chicago, speaking on *"Core Boxes for Core Blowing,"* followed by A. F. Pfieffer, Allis-Chalmers Manufacturing Co., Milwaukee, who spoke on *"Patterns as They influence Foundry Operations."* Chairman of the session was Arthur H. Stenzel, Stenzel Pattern Works, Houston.

Pattern Session Opens Conference

Patterns and core boxes have two dimensions said Mr. Jacobson, explaining that these are the product dimensions set up by the designer and the functional dimensions established by the patternmaker to produce cores and castings of specific size and shape. It is worth while to make a permanent mold for casting driers if 250 or more are needed, he declared. In discussing whether cores should be hand rammed or blown, he said simple dump type cores can be hand rammed and jolted as fast as they can be blown.

Use and value of models in casting design and development of foundry technique were described by Mr. Pfeiffer at the start of his talk. Proposed changes can be worked out by adding modeling clay to the model, he said. He declared it is sometimes cheaper to use skeleton patterns and increase the foundry cost while eliminating excessive pattern cost. He described a detailed identification system for core boxes and patterns which eliminates need for blue prints on the molding floor except in case of the most intricate cores and castings.

A.F.S. officials attending the First Texas Regional Foundry Conference included, left, Technical Director S. C. Massari and A.F.S. President Walton Woody.

Pictures are helpful to show various stages in pattern construction, Pfeiffer said, when similar patterns are made later. For patterns such as propellors, layout methods photographed for a right hand screw can be converted to the left hand merely by flopping the negative when making the print, he said. He showed how a match plate with patterns in the drag only could be made to do double duty by mounting patterns on the cope side and separating the upper and lower mold cavities with slab cores.

Urges Cooperation Between Industry Groups

At the luncheon meeting the first day, National President Woody told how A.F.S. and the foundry trade associations and equipment and supply groups can cooperate to their mutual advantage. There is no fundamental conflict between these groups, he declared stating that the trade organizations have a basic function of developing and establishing foundry trade practices. They also help interpret technical advances to their members.

One of the Society's jobs is to take students and apprentices at the end of their training and continue their education throughout adult life. Another is the A.F.S. sponsored research which directly benefits the entire foundry industry, he stated. Outlining the Society's new safety, hygiene, and air pollution program, he said the ten year program is industry-wide.

Explains A.F.S. Permanent Home Project

The program leading to a permanent headquarters for A.F.S. is an individual member project, Mr. Woody stated. First outlined at the A.F.S. Alumni Dinner during the 1950 Convention, the plan received Board approval in July, he said. Following enthusiastic discussion and approval at the Chapter Officers Conference, a personal appeal for funds was made to all members, he added. (Editor's Note: For present status of fund and list of contributors, see page 25.)

Steel Founders' Society President Thomas L. Shartle, Texas Electric Steel Castings Co., Houston, urged support of A.F.S., which he called the foundry industry's clearing house for technical information, in his introduction of Mr. Woody. John M. Bird, American Brass Foundry, Ft. Worth, presided.

Sectional meetings the afternoon of the first day included three on mechanization, ductile iron, and gating and risering, followed by two on synthetic and natural sands.

L. G. Probst, National Engineering Co., Chicago, spoke on *"A Practical Approach to Mechanization of Small Foundries"* at a meeting with Walter J. Temple, Kincaid-Osborn Electric Steel Co., San Antonio, as chairman. Advantages of mechanization given by the speaker were (1) castings can be produced at lower

cost, (2) more castings can be produced at same cost, and (3) working conditions can be improved. It is always worthwhile to mechanize if the capital investment can be amortized in three or four years, he said. He described progressive mechanization for small foundries of up to 10 molding stations for less than $50,000.

Speaking on *"Present Status of Ductile Iron,"* Albert P. Gagnebin, International Nickel Co., New York, said some 15 to 20 thousand product tons of the material would be cast in 1950. He outlined properties of ductile iron reported by current producers and showed illustrations of various types of castings being produced—pipe, compressor parts, plow points, crank and camshafts, drop forge anvils, diesel and automotive parts, and others. Robert C. Wittlinger, Pioneer Foundry, Houston, was chairman of the meeting.

T. E. Kramer, William F. Jobbins, Inc., Aurora, Ill., described techniques for gating and risering aluminum alloy castings at session presided over by John G. Collier, Garrott Brass & Machine Co., Houston. Special procedures outlined by the speaker included use of metal strainers and steel wool for eliminating dross inclusions in tall bottom-gated castings, and plaster riser bushings to retard riser solidification of permanent mold castings.

Recommends 5-Screen Sand Distribution

Sand with greater flowability allows less mold deformation and results in less metal shrinkage, declared Clyde A. Sanders, American Colloid Co., Chicago, in his talk *"Synthetic Foundry Sand Practice."* He described a study of the influence of mold materials and properties on metal shrinkage and recommended a grain distribution over five screens for best sand properties. Good casting finish and minimum shrinkage are obtained with four or five per cent of sea coal or one-half per cent of wood flow in a proper sand mixture, he said. Chairman was W. H. Lyne, Hughes Tool Co., Houston.

"Availability and Application of Natural Bonded Sands" was the subject of E. C. Sawyer, Ayers Mineral Co., Zanesville, Ohio. Session chairman was C. R. McGrail, Texaloy Foundry Co., San Antonio. Various methods of processing natural molding sands at sand producing plants and in foundries were discussed.

A Texas barbecue at the Lone Star Brewing Co. concluded the first day's activities. An entertainment program was provided through the courtesy of Lone Star Steel Co., Dallas.

Prominent patternmakers at the opening Conference session were Chairman Arthur H. Stenzel, Stenzel Pattern Works, Houston, left, and Speaker Albert F. Pfeiffer of Allis-Chalmers Mfg. Co., Milwaukee.

Three speakers initiated the second day's meetings with a roundup of information designed to help foundrymen answer the question *"Does Core Blowing Belong in My Shop?"* Speakers were Zigmond Madacey, Caterpillar Tractor Co., Peoria, Ill., L. P. Robinson, Archer-Daniels-Midland Co. (Werner G. Smith Div.), Cleveland, and Lawrence D. Pridmore, International Molding Machine Co., La Grange Park, Ill. Malcolm J. Henley, Texas Foundries, Inc., Lufkin, presided.

Following the three hour session on core blowing, design and construction of boxes and driers, blowing mixtures, and care of equipment, the group broke up for three round table luncheons. J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala., spoke on "Melting Practice for Steel Castings" at a luncheon which had Gerald E. Smith, East Texas Electric Steel Co., Longview, as chairman.

Shows New A.F.S. Research Film

S. C. Massari, A.F.S. technical director, showed the latest Society research film, the new color-sound movie on gating. Charles Sibbitt, Refinery Castings Corp., Dallas, presided at this first public showing of the second phase of the A.F.S. project on fluid flow. At a third luncheon meeting, William R. Ball, R. Lavin & Son, Chicago, spoke on non-ferrous casting practice. Chairman was John M. Bird, American Brass Foundry.

(Continued on Page 55)

Highlights of the Conference included (left) a Steel Round Table Luncheon, (center) presentation of the first A.F.S. Texas Chapter scholarships to senior engineering students Lloyd Howerton of Texas University and Fred Maxwell of Texas A & M College; and (at right), the Gray Iron Round Table Luncheon.

MODERN FOUNDRY METHODS . . . DEMONSTRATE SHELL MOLDING

A new process for producing foundry molds and cores is said to combine the advantages of increased production, reduced cost, and improved quality of the casting. The method, which was developed by Johannes Croning of Hamburg, Germany, employs a thermosetting plastic as a sand binder to produce a shell mold by application of the resin-sand mixture to a heated pattern. The accompanying illustrations show the principal steps in the process as demonstrated in the exhibit of Bakelite Div., Union Carbide and Carbon Corp., at the 1950 A.F.S. Foundry Show in Cleveland, May 8-12.

The demonstration included the actual production of molds and pouring of metal. The castings produced had good as-cast surface and close dimensional tolerances (0.002 to 0.003 in.).

The demonstration equipment used for producing the shell molds included the following:

1. Dry blender, for thorough blending of the resin-sand mixture.

2. Cast iron pattern, used for producing half molds.

3. Molding machine for application of the resin and sand mixture to the hot pattern.

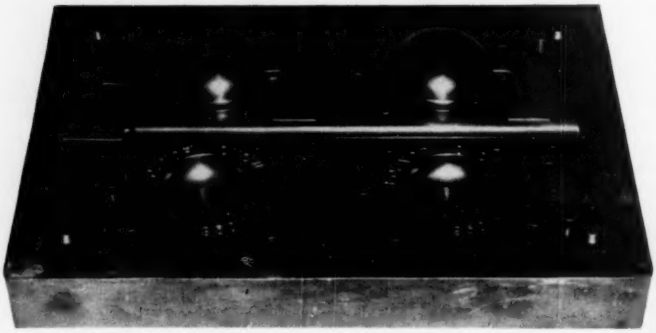
4. Oven for curing the molds.

5. Strip table for removing the finished half-mold from the pattern.

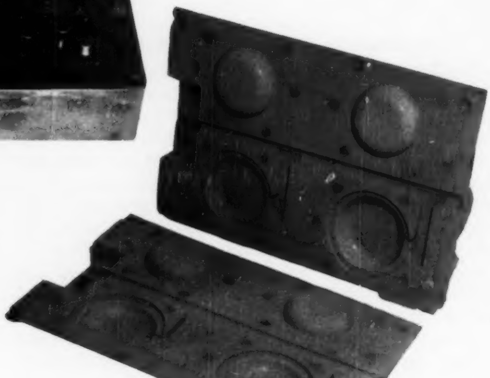
The resin-sand mixture contains 6-10 per cent by weight of resin, and sand up to 150 A.F.S. fineness. After curing, cores and molds made from the mixture have no affinity for water and no volatile contents and can be stored indefinitely.

Metal patterns, including gates and risers, are mounted on metal plates to withstand the pre-heating temperature of 400F. After the initial pre-heat the time in the mold curing oven during production maintains the pattern at the proper temperature.

The pre-heated metal pattern is clamped pattern



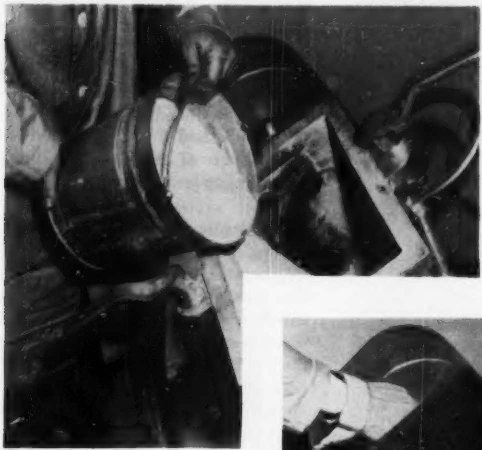
The metal pattern, including gate and riser, is mounted on a metal plate. Two half-molds produced by the process are shown below.



The casting produced with the shell molds has good as-cast surface, sharp edges, and excellent detail.

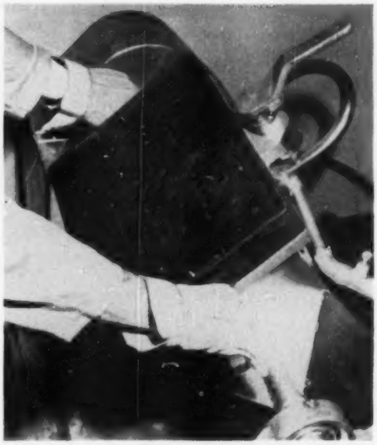
...MODERN FOUNDRY METHODS

PROCESS AT FOUNDRY EXHIBIT



The moldmaking machine used in the demonstration is charged with the resin-sand mixture.

The pre-heated pattern is placed on the open end of the machine.

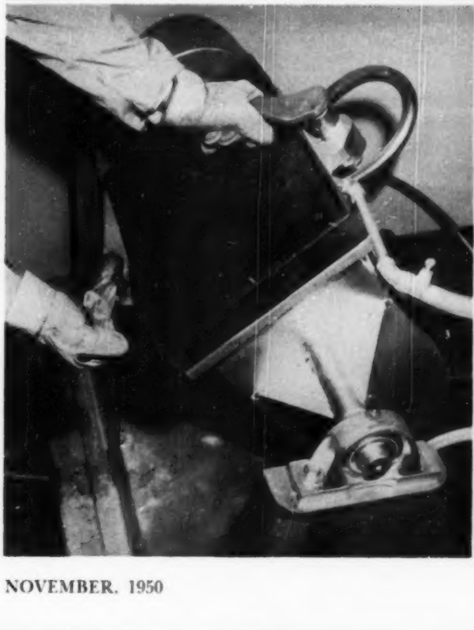


Clamps are used to hold the pattern to the face of the mold-making machine. The machine is inverted and the resin-sand mixture falls upon the hot pattern.

downward over the molding machine containing the resin-sand mixture and the assembly is quickly inverted. The molding mixture falls against the hot pattern face and plate. The resinous material softens under the heat of the pattern and adjusts closely to the face of the pattern and plate, forming a continuous coating. As the resin-sand mixture heats the coating builds up over the pattern to a thickness of 3/16 in. in 6 sec. The assembly is again inverted, the excess molding material falling away from the soft coating and ready for use on the next mold.

Curing consists of placing the pattern plate and adhering coating in an oven for 2 min. at temperature of 600F. The resin in the mixture is converted into a hard, insoluble plastic, binding the sand grains together. After removal from the oven the half-mold is stripped from the pattern by means of lifting pins. The half-mold is a thin shell with sufficient strength and rigidity for the casting operation. A complete mold is assembled by clamping two half-molds together. If cores are required, they are assembled in the mold in the usual manner.

Cores are made in the same manner, except that the resin-sand mixture is blown up into a hot split metal core box by means of compressed air. The excess material falls out of the box when the air flow is stopped. The cores are hollow and of the same thickness as the molds.



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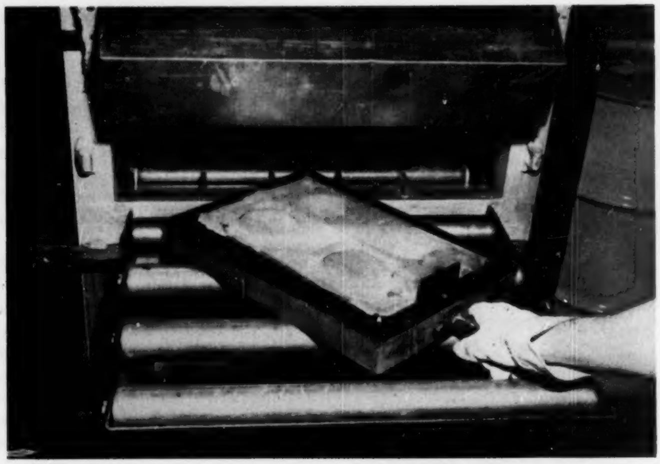


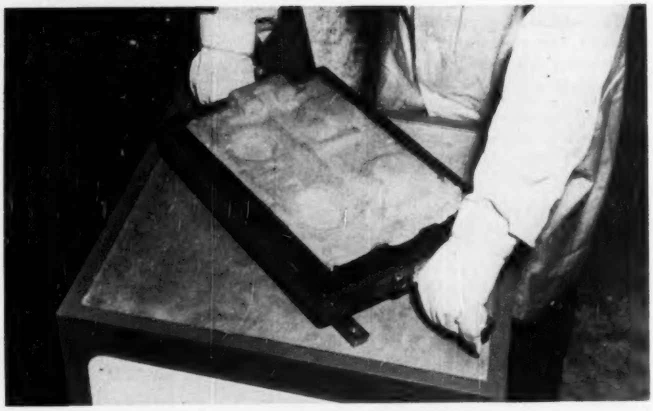
Molds are prepared for casting by placing the clamped half-mold assembly in the flask with the gate in a vertical position, and the surrounding space filled in with steel shot or other suitable bedding material. The bedding supports the thin mold shell so that it will resist the pressure of the liquid metal and maintain dimensional stability.

The liquid metal is poured into the mold in the usual manner. The hot metal on coming in contact with the mold and cores is formed to the desired shape and surface finish. Gases generated pass readily through the mold shell, since the mold has very high permeability. The mold and core offer very little resistance

Pattern with adhering layer of resin-sand mixture is placed in an oven for curing the mold.

After curing, the mold is removed from the pattern by means of knock-out pins.

Two half-molds are placed face to face to form a mold and held together with metal clamps. The mold is placed in a flask and backed up with steel shot to keep the mold halves from spreading.

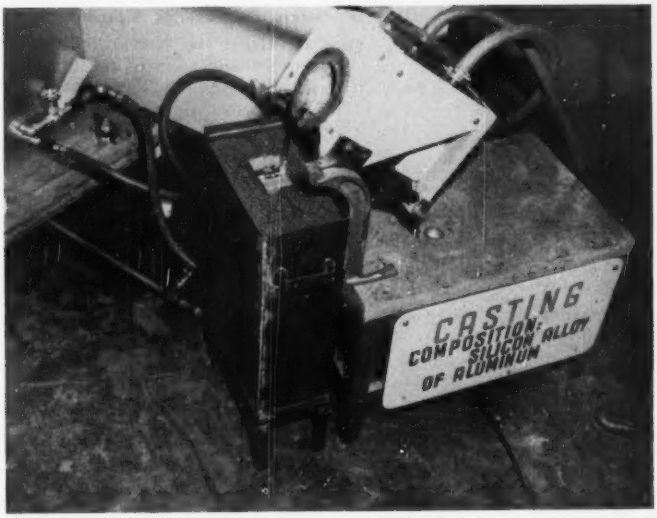


...MODERN FOUNDRY METHODS

to the casting as it solidifies and contracts, minimizing the formation of cracks or hot tears.

The casting is easily removed from the mold. Cores can be removed by lightly tapping the casting. The bedding material is recovered for re-use.

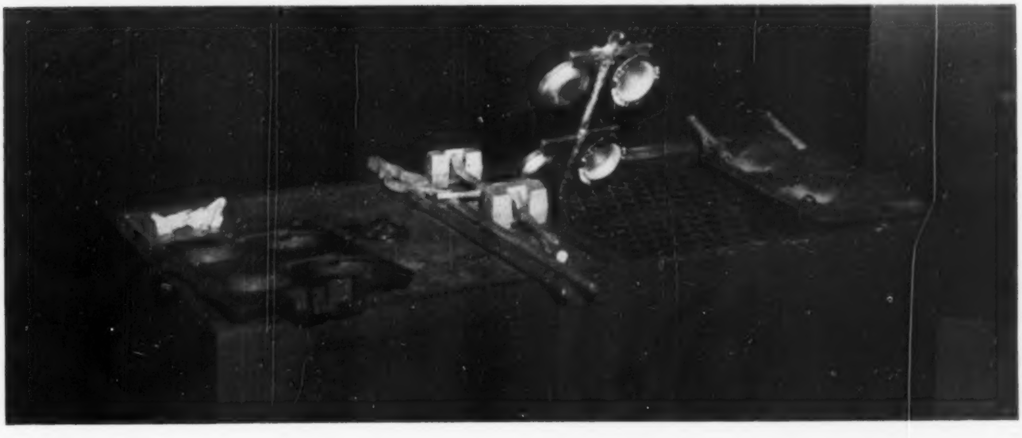
The advantages claimed for the process include: castings are produced with sharp edges, dimensional accuracy, and unchilled surfaces: casting of thin sections is possible —steel sections 1/10-in. in thickness can be cast: increased production for given molding floor space and labor.



During pouring the hot metal burns ↑ away most of the resin. The mold, although retaining sufficient rigidity to support the casting, is easily removed.

← Pouring the mold. The high permeability of the mold permits free escape of gas and prevents formation of porosity.

Castings of various ferrous and ↓ non-ferrous alloys are said to have been poured successfully in shell molds. In the demonstration the casting shown on the knockout grid was made of aluminum.



CANADIAN CONFERENCE FEATURES SAND, MELTING, NODULAR IRON

FOUNDRYMEN OF CANADA showed approval of the Third All-Canadian Regional Foundry Conference program—built around the theme "Good Castings Are Permanent"—when 504 registered for the three-day meeting in Hamilton, Ont., September 28-30. On the technical program were a five-session sand school, sessions on ferrous and non-ferrous melting, a meeting on nodular iron, and a talk on foundry history. Plant visitations and an address on practical psychology of human relations rounded out the program arranged under the direction of Conference Chairman Reginald H. Williams, Canadian Westinghouse Co., Ltd., Hamilton.

Distinguished guests participating in the program included Marc Boyer, deputy minister, Bureau of Mines and Technical Surveys, Ottawa; A.F.S. Vice-President Walter L. Seelbach, Superior Foundry, Inc., Cleveland; National Director J. J. McFadyen, Galt Malleable Iron Co., Galt, Ont.; Mrs. Ellen Fairclough, member of Parliament and acting mayor of Hamilton; Past National Director Bruce L. Simpson, National Engineering Co., Chicago; and Professor Albert De Sy of Belgium's University of Ghent.

Sand School Sets Attendance Record

All sessions were held in the Royal Connaught Hotel where registration started the morning of the first day, followed immediately by the first sand school session. In opening the school, Frank S. Brewster, Harry W. Dietert Co., Detroit, who conducted all sand meetings, stated that the registration of 158 exceeded that for any of the sand schools held previously. Alex Pirrie, Gurney Dominion Furnaces Ltd., Toronto, and Willard A. Jones, Canadian Westinghouse Co., arranged the sand school and presided at the sand sessions.

Sand tests are of no value if the results are not applied in the foundry, Mr. Brewster said, in launching his series of discussions totalling some 15 hours on sand testing. Minimum molding sand control program in any foundry calls for tests for moisture, permeability, green compression, green deformation, dry compression, air-set compression, and green hardness, he declared, after outlining a paying sand control program. The sand school covered the entire field of molding and core sand control, interpretation of test results, sand preparation, and elimination of casting defects due to sand conditions.

At the first day's luncheon, Acting Mayor Fairclough extended the hospitality of the city of Hamilton. She was introduced by Russell A. Woods, Geo. F. Pettinos (Canada), Ltd., Hamilton. National Director J. J. McFadyen, Galt Malleable Iron Co. Galt, Ont., who presided, told of the growth of the Ontario chapter from the 17 men who decided to start the group to its present membership of 277.

Outlines History Of Castings Industry

Plant visitations and the second sand school session occupied foundrymen the afternoon of the first day which concluded with a dinner and talk *"Development of the Metal Castings Industry"* by Bruce L. Simpson, author of the A.F.S.—published book of the same name. Preceding the historical lecture, Mr. McFadyen commented on the serious intent and purpose of the national officers and directors and introduced Vice- President Seelbach.

Whether North America gets into war or merely becomes an armed camp, tremendous production on demands lie ahead, said Mr. Seelbach. Foundries will have to meet greater demands than ever before and to do this, he said, they must (1) take advantage of A.F.S., its sources of information, and its researches, (2) have adequate cost systems, and (3) train more men to produce and supervise production of castings.

J. A. Wotherspoon, J. A. Wotherspoon & Son Ltd., Oakville, introduced Mr. Simpson who explained that he wrote his popular book to give publicity to the glamorous past of the foundry industry and to draw attention to its present importance. He traced the development of the foundry industry from pre-historic

Prominent on the program of the Third All-Canadian Regional Foundry Conference were: (left) James G. Dick, Canadian Bronze Co., Montreal, who spoke on "Melting of Brass and Bronze"; (right, seated) Edward A. McFaul of Midwest Institute, Chicago, principal banquet speaker; and, introducing Mr. McFaul, Ontario Chapter Chairman Murray N. Tallman, A. H. Tallman Bronze Co., Ltd., Montreal, presiding at the Banquet.

days to the 20th century. Jas. H. Newman, Newman Foundry Supply Ltd., Montreal, thanked the speakers on behalf of their audience.

Conference activities the second day started with plant visitations and the sand course, the latter continuing throughout the afternoon. Simultaneous afternoon technical sessions featured James G. Dick, Canadian Bronze Co., Ltd., Montreal, speaking on *"Melting of Brass and Bronze,"* and Harold N. Bogart, Ford Motor Co., Dearborn, Mich., on *"Up-to-date Melting Mediums for Cast Iron, Malleable, and Steel."*

Mr. Dick outlined the fundamentals of gas solubility and methods of avoiding and removing gases in molten metal. He described the various types of furnaces used for melting non-ferrous metals and commented on their advantages and limitations. Frank B. Diana, B. Wagman & Son Ltd., Toronto, was meeting chairman.

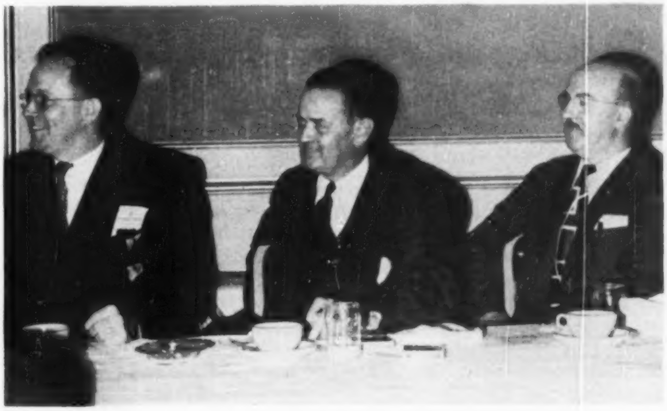
In his talk, Mr. Bogart described and evaluated cupola melting methods involving water cooling, air placement of lining materials, oxygen enriched blast, basic linings, moisture control of the blast, hot blast, and a radioactive metal height gage. Oxygen is universally used in electric furnace melting, he said, because it reduces slag handling, hastens heats, and in stainless steels permits reduction of carbon without much chromium reduction. The electric furnace may become an important factor in nodular iron production, he stated.

Mr. Bogart described various multiplexing operations, declaring that they are uneconomical unless special conditions prevail. Presiding at the meeting was John Perkins, Ford Motor Co. of Canada, Windsor.

Principal speaker at the conference banquet was E. A. McFaul, Midwest Institute, Chicago, who explained a supervisor's problems and how to solve them in his address *"What's Your Washroom Rating?"* A. Jack Moore, Montreal Bronze Ltd., spoke briefly in appreciation of Mr. McFaul's talk.

Among the guests introduced by Murray N. Tallman, A. H. Tallman Bronze Co. Ltd., Hamilton, who presided at the banquet, were Deputy Minister Marc Boyer, A.F.S. Past President W. B. Wallis, Pittsburgh Lectromelt Furnace Corp, Pittsburgh, and Past National Director Joseph Sully, Toronto. A program of entertainment concluded the day.

A revealing report on current developments in nodular iron research in Belgium and the final sand session closed the Third All-Canadian Foundry Conference the morning of September 30. Nodular iron speaker was Dr. Albert De Sy whose researches have been published in AMERICAN FOUNDRYMAN and leading technical journals abroad. In introducing De Sy, J. E. Rehder, Bureau of Mines and Technical Surveys, Ottawa, stressed the value of international cooperation on research and the exchange of information through personal contact.



Speakers' table occupants at the Conference Banquet were, left to right: Conference Chairman Reginald H. Williams, Canadian Westinghouse, Ltd., Hamilton, Ont.; Marc Boyer, Deputy Minister, Bureau of Mines and Technical Surveys, Ottawa; and Lucien Guilmette, Canadian Foundry Supplies and Equipment Co., Ltd., Montreal, chairman of A.F.S. Eastern Canada Chapter. (Canadian Regional Conference photographs courtesy of Leo Frankel of Frankel Bros., Ltd.)

Professor De Sy described in detail his recent studies in the research laboratory and in the foundry designed to develop both theoretical and production aspects of nodular iron. Experimenting with a ternary alloy of pure iron, carbon, and silicon melted in an induction furnace, he concluded from current knowledge that magnesium is the best element to use from the cost and technique standpoints. Lithium, strontium, barium, and calcium also produce nodular graphite, while sodium and potassium cause the hypereutectic carbon to form as nodules with the balance in quasi-flake form.

In a four ton hypereutectic iron casting, essentially ferritic nodular iron, Dr. De Sy reported that he found a small amount of two unusual types of graphite which he designates "crab" graphite and "forked stick" graphite. He found a concentration of spherulites in the top one inch of the casting which resulted in a carbon analysis of 10 to 12 per cent.

Deputy Minister Boyer followed De Sy with an invitation to further extend international cooperation and for foundrymen to present their problems to the Bureau of Mines and Technical Surveys. Dr. John Convey of the Bureau delivered an appreciation of Prof. De Sy's talk.

Ontario chapter members who planned the conference were: *general chairman*, Reginald H. Williams, Canadian Westinghouse Co., Ltd., Hamilton; *secretary*, E. C. Jennings, Metals & Alloys Ltd., Toronto;

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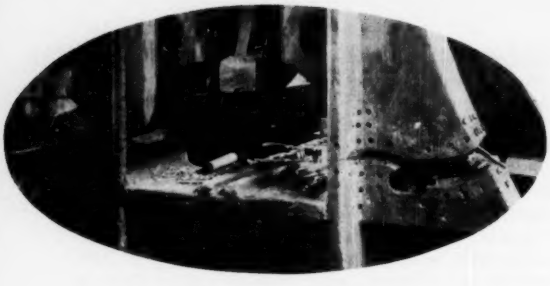


Fig. 14—Cracked gray iron end frame has been veed and partially studded preparatory to making repair weld.

This is the second section of the material on elevated temperature methods of welding, joining, and cutting gray iron, which will constitute Chapter VII of the Gray Iron Handbook, to be issued by the Gray Iron Founders' Society, Inc. The remainder of the article will appear in future issues of AMERICAN FOUNDRYMAN.

gray iron WELDING JOINING CUTTING

C. O. Burgess
Technical Director
Gray Iron Founders' Society, Inc.
Cleveland

PART II

2. Arc Welding With Mild Steel Electrode: One of the first processes to be used successfully on gray iron is that of arc welding with a mild steel electrode. The resultant weld, particularly if studded, is strong, gives a good color match, and can be used before enameling or chromium plating. Despite definite limitations, many large castings can be and have been welded in position using such electrodes, which are the least expensive of the various electrodes used for welding gray iron.

Difficulties connected with the process, however, result in a somewhat limited range of application. It is virtually impossible to prevent the formation of a hard zone or layer at the juncture of the steel weld metal and the gray iron base metal, and this type of welding should not be used where machinability is a factor. Furthermore, since the shrinkage of steel is greater than that of gray iron, high stresses develop which can result in cracking of the casting, and it is very difficult to obtain liquid-tight joints.

Because of these limitations, arc welding of gray iron with steel is becoming progressively confined to the repair of small pits and cracks, with some application in the repair of breaks in very large castings that require no machining.

For most repair jobs, veeing is the same for this type of welding as for those already discussed. However, the formation of a hard zone as a result of dilution at the line of fusion, generally makes it necessary to employ studs which key the weld to the unaffected gray iron below this layer, and thus insure a strong weld.

Although dimensions vary with the job, these steel studs are typically ¼-⅝ in. in diameter, projecting 3/16 to ¼ in. above the surface and screwed in to a depth at least equal to their diameter. It is recommended that the cross sectional area of the studs should be 25-35 per cent of the area of the weld surface.[17] A modified studding procedure can be used for repair of small cracks.[18]

Since no attempt usually is made to get a machinable weld, preheating is only necessary when the part to be welded is in a position such that expansion would cause excessive stresses in other parts of the casting. In the latter case, a preheat of 950-1050 F is desirable. If studding is employed, preheating is sometimes omitted.[8]

A coated mild steel rod is normally employed. The deposited beads should be short and widely separated. Recommendations include allowing each bead to cool 3 to 5 min, while despositing metal on some other part of the prepared section. A weaving bead may also be used. Each bead should preferably be peened after deposition.[17]

If studs are employed, one or two beads should first be laid around the studs in order to insure intimate bonding with the welding material.[17]

In one variation, the flux coating contains graphite

Fig. 15—Arc welding with mild steel electrode was used to make repair weld of end frame shown in Fig. 14.

and silicon carbide in order to produce a weld composition similar to the base metal. In this case the recommended flux composition is: 40-60 per cent graphite, 1 per cent barium chloride, remainder carborundum.[17]

3. Arc Welding With a Cast Iron Electrode: The cast iron electrode has found a definite but limited use in the repair welding of gray iron. It is faster than oxy-acetylene welding for the repair of small defects, and under certain circumstances may give a weld of comparable strength and machinability, although uniformity of results cannot be guaranteed.

Machining and cleaning operations are the same as those used for mild steel. A preheat is necessary; claims have been made that good results can be obtained with a preheat as low as 300 F; however, since this process involves the highest heat input of all the welding methods, 1000 F or more would seem necessary to assure machinability.[15,20]

A typical composition[20] for a gray iron electrode is:

Composition, per cent

T. C.	3.49	Si	3.33
Mn	0.77	S	0.022
P	0.90	Mo	0.11

A medium to long arc should be held, and an A. C. current of about 150 amps. is recommended.[6] Welding procedure resembles that for mild steel with a few exceptions. The walls of the vee should be washed into the weld metal in order to produce maximum penetration. At the end of a bead the arc should not be broken abruptly, but rather drawn out and held for a short time.

In multiple pass welding, the preceding pass should not be allowed to cool.[6] In Germany, where this method is more widely employed, it is common practice to use a technique similar to oxy-acetylene welding. A puddle is formed which is prevented from spreading by graphite dams. The largest possible electrode and current are used.[27]

4. Carbon Arc Welding With a Cast Iron Filler Rod: Despite the fact the cleaning and beveling are not as necessary as for most other weld methods, and that a machinable weld with good color match can be produced, carbon arc welding has not been widely used for the joining of gray iron. This neglect is due to the necessity of a much higher preheat, the difficulties involved in handling the arc, and the extreme fluidity of cast iron at the high temperatures produced by the carbon arc.

A preheat of 1400 F is preferable, and at least 1000 F is necessary.[21] In one successful operation[21] a current of 800 amps. straight polarity, an electrode ⅝ in. in diameter, and an arc 1½ in. long were used. A flux consisting of equal parts of sodium carbonate and sodium bicarbonate was employed.

5. Inert-Gas Tungsten-Arc Welding: The recently developed inert arc processes have been used with some success on gray iron. The distinguishing feature of the process is the use of a stream of inert gas, either argon or helium, to prevent oxidation of the electrode or added filler metal and to prevent oxidation of the molten metal under the arc. The electrode is of tungsten and is not appreciably consumed during welding.

Any added metal is introduced in the form of a filler rod, melted in the heat of the tungsten arc and under the protective gas atmosphere. In addition to preventing oxidation and, therefore, formation of a high melting point slag, this method of welding by control of the arc can lift and break oxide films.

These characteristics yield several distinct advantages not obtainable in other forms of welding: no flux is required; the completed weld has little or no slag covering, thus minimizing cleaning and grinding operations; the weld itself tends to be free from blow holes that must be worked out in ordinary welding; and, since practically no oxidation takes place, the weld metal is substantially of the same composition as the filler rod used. Also, welding can be done in any position.

Process Has Development Possibilities

Although there is no question that inert-gas welding shows promise as a welding process for gray iron, and it has been claimed that it can be successfully used for production welding (in fact, gray iron has been successfully welded to stainless steel by this process), the limited application that has so far been made does not provide sufficient data for a final evaluation of its worth in competition with other welding processes.

It is more rapid than oxy-acetylene welding and even than most arc welding, although it has been reported to lack flexibility and uniformity of results of the former process and the ease of application of the latter. Cost consideration connected with installing the original equipment and with the use of argon or helium must be considered in any decision.

Although aluminum and silicon bronze as well as nickel filler rods may be used in inert gas welding, it is more common to employ gray iron rods similar to those used in oxy-acetylene welding. A single or double bevel with a 60-90° included angle is employed. The casting should be preheated to a temperature of 500-1050 F.

Alternating current or straight polarity direct current are both satisfactory for welds up to ½ in. in thickness in the flat position. Direct current straight

Fig. 16—Building up a worn valve seat in a gray iron diesel cylinder head by means of inert-arc welding.

Fig. 18—This gray iron gear housing was repaired by arc braze welding with aluminum bronze electrodes.

Fig. 17—Steel fuel feed line arc braze welded to gray iron ell in automatic stoker on production basis.

polarity is preferred for flat positioned welds in sections over 1 in. in thickness, whereas A.C. is recommended for all welds in the vertical, overhead, or horizontal positions.

For welding in the flat position, the holder is moved steadily along the vee or reciprocated back and forth. Weaving should be avoided.

For welding in the vertical position, a weaving technique and beginning the weld at the bottom is recommended.

In the overhead position, the rod is dipped into the leading edge of the puddle, the torch is moved ahead to allow partial solidification of the puddle, and then the torch is moved back over the puddle and the operation repeated.

For welding in the horizontal position, that is, for welding vertical sections in a horizontal direction, a weaving technique is recommended.

For maxiumum machinability and for stress relief where close tolerances are to be maintained, a postheat of 1250 F is recommended although not obligatory. In any case, precautions must be taken to insure slow cooling.[24, 28, 29, 30]

6. Arc Braze Welding: In many applications involving joining of large gray iron parts, such as gray iron ways to steel beds or repair of cylinder blocks, machine bases, large end bell housings and the like, arc braze welding has been recommended. Claims have been made as to the high tensile strength, speed of welding and ease of application possible with these electrodes. They are, however, generally considered as inferior to gas welds made with gray iron or bronze rods unless minimum heat input is a necessity, and they cannot be used where machinability and color match are required. Despite such limitations, bronze electrodes[23] under some circumstances may be logical welding material for gray iron. The arc-deposited metal is also valuable for die overlays, and will provide some corrosion resistance.

There are four common types of bronze electrodes which may be employed with gray iron:

1. Probably the most commonly used electrode is an aluminum bronze containing about 90 per cent copper and 8 per cent aluminum. It is recommended for joining alloy gray irons, and is also used for bonding gray iron to steel, bronze and other metals, and has been employed for bearing surfaces.

2. A bronze containing 4.5 per cent tin, 0.05 per cent phosphorus, 0.02 per cent tin and the balance copper is more corrosion resistant, and can be used either on bearing surfaces or for general gray iron joining.

3. An electrode consisting of 3.0 per cent silicon and the balance copper can be used for bonding gray iron to silicon bronze.

4. A high-aluminum bronze containing approximately 80 per cent copper, 12 per cent aluminum and the balance iron is used for die overlays.

Machining for "veeing" operations preparatory to welding are the same for this process as for other processes previously described. A preheat of 250-400 F is recommended if possible, but when the necessity arose, large castings have been welded in place without a preheat. Some degree of machinability can be obtained with a preheat of 600-800 F.

Dies should be heated to 400 F before attempting overlaying. Where very accurate dimensions must be retained by minimizing distortion due to the normal difference in thermal contraction of gray iron and bronze, a "buttering" technique, in which a preliminary layer of bronze is deposited and partially machined off previous to final welding, is sometimes used.

The smaller sizes of electrodes are recommended. In a typical application the weld is built up by stringer beads 3-5 in. long deposited by the skip welding technique. It may be advisable to peen each deposit. The casting should be postheated to the preheat temperature or slightly above if possible.

Brazing: The brazing method has been defined by the American Welding Society as: "A group of welding processes wherein coalescense is produced by

heating to suitable temperatures above 800 F and by using a non-ferrous filler metal having a melting point below that of the base metal. The filler metal is distributed between the closely fitted surfaces of the joint by capillary attraction."[10] This last limitation excludes braze welding, which has been discussed in the foregoing.

Two main classes of brazing alloys are used, namely, copper or copper-base alloys, and silver-base alloys. The latter are sometimes popularly called silver solders.

1. Silver Alloys: Brazing with silver alloys is of particular value in the case of gray iron and is one of the processes now regularly used in production. A bond as strong or stronger than the parent metal can be formed, and the process is simplified by the fact that the flow point of the alloy is only 1100-1200 F, considerably below temperatures involving danger of hardening or of excessive stresses from uneven expansion. Thus gray iron can be silver brazed with assurance that losses from such causes will not occur.

The cost of the silver alloy, on the other hand, is fairly high; so that it cannot be economically used where any filling-in of large gaps or cavities is necessary. Both for this reason and for maximum strength in the final joint, the part should possess machined clearances between 0.0015 and 0.005 in. Consequently, brazing with silver alloys is confined to castings that are machined to fairly close tolerances.

It should be noted that this limitation is often not serious as evidenced in consideration given to silver brazing 4-in. diameter gray iron pipe sections. Silver brazing is not employed for castings intended for high temperature applications.

It is very important in silver brazing to have a properly prepared surface. A high quality, fine-grained gray iron often needs no special treatment after machining, but the surface of some high carbon gray irons must be degraphitized in catalytic salt baths, seared with a torch or given an equivalent treatment for best results.

The surfaces to be joined must next be painted with a flux, usually of a bi-flouride type active at 1000 F. This flux is necessary for developing maximum fluidity and good tinning properties in the silver brazing alloy.

The brazing alloy normally used contains from 40 to 50 per cent silver, the remainder being made up of approximately equal parts of copper, cadmium and zinc. The alloy is supplied in the form of thin strip or wire, and is either placed on the surface to be joined in special slots in the joint or fed into the joint as it is being heated. The parts are then held together with simple jigs so as to prevent sagging or other separating or misaligning of the parts.

Several brazing processes can be employed:

(a) Torch brazing using suitable air or oxygen with acetylene or other fuel gas mixtures. An approved method is to use a multiple-head oxy-acetylene torch with a neutral or reducing flame. Direct impingement of the flame on the brazing material except momentarily is not recommended. If metals of different section size or differing heat conductivity are being joined, care should be taken that they both reach the brazing temperature simultaneously.

(b) For brazing of small or medium sized parts

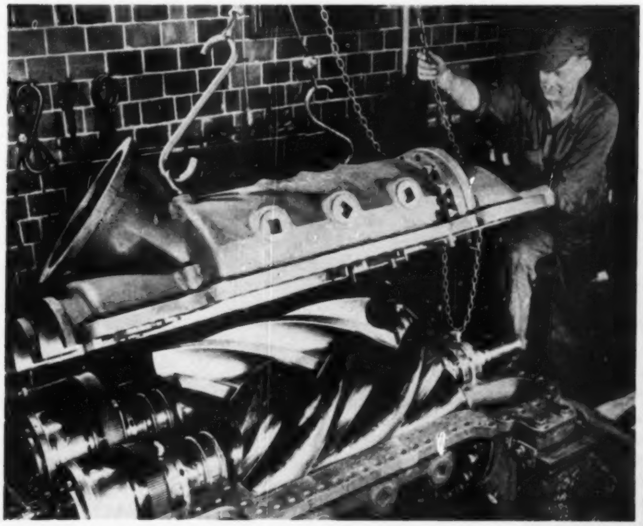
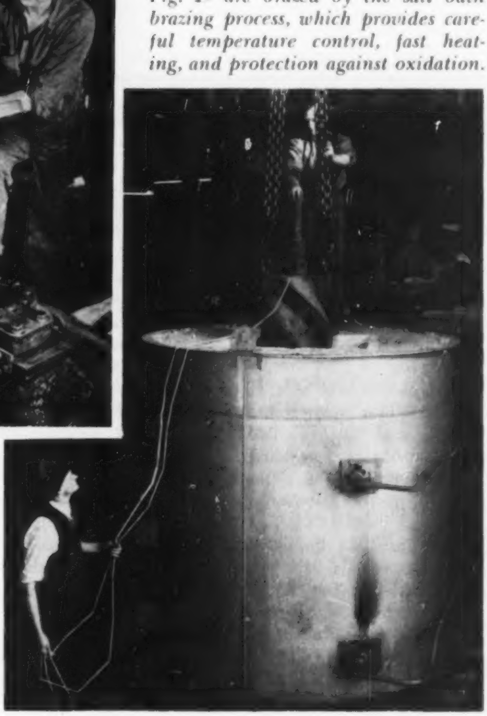


Fig. 19 (left)—Gray iron rotors for a compressor are threaded on a steel shaft, and then silver-brazed in place.

Fig. 20 (below)—The rotors shown in Fig. 19 are brazed by the salt bath brazing process, which provides careful temperature control, fast heating, and protection against oxidation.



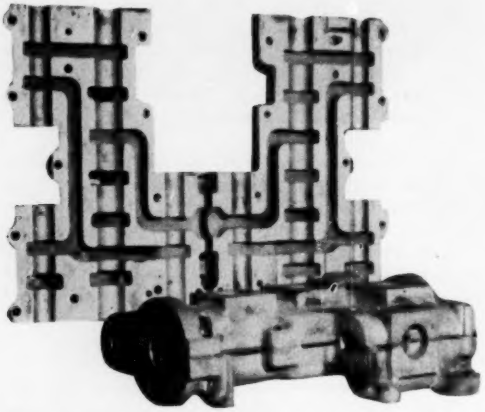


Fig. 21—Casting of this hydraulic valve in two parts and assembling by silver brazing simplifies the work of the designer, patternmaker, foundry and machine shop.

on a production basis, furnace brazing using oil, gas or electric furnaces may be used, preferably avoiding an oxidizing atmosphere.

(c) In resistance brazing the parts are placed under pressure between two electrodes, usually carbon electrodes. This process enables careful control and eliminates the necessity for jigging.

(d) Very rapid heating, confined to the joint to be brazed, can be provided by induction brazing. Less flux need be used in this method, and cleaning operations are simplified.

(e) Dip brazing, in which parts are dipped in a molten bath of the brazing alloy, is best suited to small parts.

(f) Chemical dip or salt bath brazing provides careful temperature control, fast heating, and protection against oxidation.

After brazing the flux is removed from the joint by wiping, dipping or spraying the surface with water after it has cooled enough so that the brazing alloy has set. The brazing of gray iron with silver alloys promises to become a very useful method of joining. It may be used to join gray iron to gray iron (as in the present regular production of piston rings with brazed-on lugs) or to steel or non-ferrous materials.

The use of gray iron is particularly facilitated in mixed assemblies, where its valuable properties are needed. The economic possibilities of simplifying complicated castings involving difficult feeding or coring problems by casting them in two or more parts, and reassembling the parts into a single casting by brazing, has been investigated and shows considerable promise.

2. Copper and Copper-Base Alloys: Comparatively pure copper has been used to join press-fitted parts of various metals. Its use in the case of gray iron is definitely limited, however, because of the high temperatures (2000 F or above) required to render copper fluid enough to penetrate and effectively unite press-fitted parts. Phosphorus-copper alloys are unsuitable because of their tendency to form phosphides with ferrous metals. On the other hand, some of the bronzes, for example, a 6 per cent tin-bronze melting at about 1700 F, have been successfully employed. It is usual to allow clearances of 0.0015 to 0.005 in. at the joints as in the case of silver brazing alloys.

The chief disadvantages as concerns general application of copper and copper-base alloys in brazing gray iron reside in the necessity for a hydrogen atmosphere in the furnace and comparatively high brazing temperatures.

Acknowledgment

The author desires to thank the following companies for their courtesy in supplying the photographs appearing in this section of the article: Lincoln Electric Co., Cleveland; Ampco Metal, Milwaukee; the Elliott Co.; and Kolene Corp., Detroit.

NOTE: The complete bibliography will be published with the final section of the article.

N. Y. Regional Conference Souvenir

MEMENTOS of last year's regional foundry conferences remind foundrymen that another season of regional meetings with their technical sessions and plant visitations is about to start. One of the outstanding mementos of last year is an ash tray distributed at the New York State Regional Foundry Conference held at the University of Syracuse under the joint sponsorship

of the school and the Central New York, Eastern New York, Rochester, and Western New York Chapters.

Everyone attending this regional conference received a cast ash tray illustrated above. Design was by William D. Dunn, Oberdorfer Foundries, Syracuse, who carved the A.F.S. symbol which forms the bottom of the tray. Wood master pattern was made at Goulds Pumps Inc., Seneca Falls, and the A.F.S. symbol was inserted at Oberdorfer Foundries where a master pattern was made in a plaster mold. Sims Matchplate Co., Syracuse, made a four piece match plate and Oberdorfer cast the ash trays. Some 400 were eventually available in an aluminum alloy for distribution at the conference and a few were cast in bronze. Mr. Dunn reported that the ash tray had the largest "scrap loss" of any job ever run in the Oberdorfer foundry; trays continually disappeared during production.

DIVISION AND GENERAL INTEREST TECHNICAL COMMITTEES MEET

SEVEN A.F.S. Gray Iron, Steel, Sand and Malleable Division and general interest technical committees have held meetings at A.F.S. Headquarters in Chicago and in Buffalo and Detroit in recent weeks.

On September 11, the Committee for a proposed Symposium on Principles of Gating met in A.F.S. Headquarters, Chicago, to make tentative plans for presentation of the Symposium during the 1951 A.F.S. Convention, April 23-26 in Buffalo. A joint presentation of the A.F.S. Aluminum and Magnesium, Brass and Bronze, Gray Iron Malleable and Steel Divisions, as planned by the Committee the Symposium will run from 9:15 a.m. to 11:45 a.m., Tuesday morning, April 24, with an introduction and five 15-minute presentations separated by 15-minute discussions. It was considered desirable by the Committee that the Symposium concentrate on gating systems with runners and gates at the mold parting because of their commercial value. Afternoon session of the all-day program would be devoted to discussion of experiences in application of good gating principles.

In the absence of Chairman Hiram Brown, R. F. Thomson (Aluminum and Magnesium) presided. Others attending were V. A. Crosby (Gray Iron), R. E. Kerr (Steel), R. P. Schauss (Malleable), W. E. Sicha (Aluminum and Magnesium) and A.F.S. Technical Director S. C. Massari.

Timestudy Convention Program Discussed

Timestudy and Methods Committee met September 22 at A.F.S. Headquarters, Chicago, to consider its 1951 Convention program. It was decided to sponsor two sessions: (1) Part II of the Fatigue Study Survey, to be conducted by M. E. Annich, American Brake Shoe Co., and (2) a session on *"Job Costing Using Standard Data,"* to be presented by J. E. Westover, Westover Engineers, Milwaukee.

Committee Chairman E. G. Tetzlaff announced his resignation effective as of the meeting and the Committee elected M. E. Annich to succeed him, with J. J. Farkas as vice-chairman. Concluding the meeting was a review of the present status of the Committee's proposed Timestudy and Methods Symposium to be published in the near future.

Committee members present were E. G. Tetzlaff, chairman; J. J. Farkas, M. T. Sell, Dean Van Order, J. A. Westover and Technical Director Massari.

Review Malleable Research Project Bids

Opening a meeting of the A.F.S. Malleable Division Research Committee held at A.F.S. Headquarters on September 25 was a review of bids from educational institutions for carrying out the project. Also considered and approved were plans for a test casting designed to evaluate the tendency of a given melt to create hot tears, as well as to measure shrinkage of the metal. Attending the meeting were Chairman C. F. Joseph, W. A. Kennedy, J. H. Lansing, C. F. Lauenstein, Richard Schneidewind, A. H. Rauch (for H. Bornstein), R. P. Schauss, W. D. McMillan, Milton Tilley and Technical Director S. C. Massari.

Gray Iron Round Table Luncheon Committee met in the offices of the Hanna Furnace Co., Buffalo, September 26. First order of business was a discussion of possible subjects for the Luncheon, to be held during the 1951 Convention. Subjects suggested included basic cupola operation, water-cooled bosh, water-cooled tuyeres, air pollution and foundry raw materials.

Subject agreed upon is available foundry raw materials as applied to gray iron melting, to be subdivided into sections on carbon control; flux, slag, desulphurizing and rapid slag control tests used by blast furnace operators as applied to cupola operation; and melting gray iron in the sklenar-type furnace. Separate speakers will present each phase.

Committee members attending were Chairman L. L. Clark, J. F. Dobbs, C. A. Harmon, J. O. Ochsner and Jos. E. Foster, A.F.S. Technical Assistant. Guests at the meeting were E. J. Burke, Hanna Furnace Corp., and J. A. Feola, Crouse-Hinds Co.

Report On Sand Experiments

Meeting at the Congress Hotel, Chicago, on September 29, the A.F.S. Sand Division's Committee on Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures discussed preparation of data resulting from its recent experiments at the University of Michigan. This work is confined to the expansion type of scab. The Committee further decided that it will study influences affecting veining of cores.

Meeting to formulate its program for the 1951 Convention in Buffalo, the Sand Shop Course Committee tentatively planned three sessions to be held the evenings of April 23, 24 and 25. First session, it was decided will deal with *"Malleable Foundry Sand Control;"* the second with *"Shell Molding and Use of Resin Binders;"* and the third with *"Foundry Sand Control."*

Attending were Chairman R. H. Jacoby, F. S. Brewster, H. W. Meyer, R. H. Olmstead, and A.F.S. Technical Assistant Jos. E. Foster. Meeting was held October 3 at the Book-Cadillac Hotel, Detroit.

Steel Research Maps Future Plans

Meeting October 16 at A.F.S. Headquarters, the Steel Division's Research Committee first reviewed its plans for the future. R. W. Wilson of Armour Research Foundation described initial experiments conducted to determine of dimensional changes in cores could be measured with a device suggested by Technical Director Massari. It was reported that the method is satisfactory except that considerable lag occurred in temperature measurements. Experiments, Mr. Wilson said, will be carried on involving preheating of the thermocouple. Armour is awaiting receipt of radioactive cobalt for use as a source of gamma rays in hopes of producing a record of hot tears as they form immediately after casting.

Steel Casting in SOUTH AFRICA —Feeding Techniques

Production of certain classes of steel castings in regular demand are reviewed in this outline of the size and scope of the steel foundry industry in South Africa. Yield figures are analyzed in the light of the various local factors involved, and a detailed survey of feeding techniques employed is included.

H. G. Goyns
Westdene, Benoni
Transvaal, South Africa

Production of steel castings in South Africa is of comparatively recent origin, the first being made during the 1914-18 war. At that time there were few molders in the country who had any experience in steel foundry practice.

In the initial stages the bulk of the tonnage consisted of castings for replacement and repair of existing plant. Due to the urgency associated with breakdowns, and the fact that one-off jobs were the rule rather than the exception, improvisation was the order of the day.

In many cases castings were produced under almost impossible circumstances, having in mind the lack of flask parts, makeshift hoist equipment, uncertain quality of sand, and shortage of raw materials. Technical control simply did not exist and success depended almost entirely on the skill and experience of the man on the floor who, with the minimum of pattern and molding equipment, unquestioning faith in Providence, and not much faith in the metal, produced the goods.

Through the years this flair for improvisation developed until these conditions were accepted as normal by the engineering community. Thus, with the passage of time the foundryman was expected to produce castings of ever-increasing complexity, despite his primitive plant and lack of facilities. In the jobbing shops, which numerically comprise the great majority of the foundries, these conditions are still evident.

Present Scope of Industry

During the past decade the industry has grown enormously, and is now responsible for a finished tonnage of 40 to 50,000 tons annually. Published figures indicate that this is equivalent to approximately one eighteenth of the tonnage produced in America. The expansion has been fostered by war conditions and more recently by import control.

To anyone who has taken the time to study developments in America and Britain, it is evident that the strides which have taken place are the logical progression following upon the growth of technical and research organizations which cater directly to the industry. Bearing in mind the small size of the industry in this country in relation to overseas standards, it has been considered out of the question from the financial standpoint to establish similar facilities which would benefit the local steel founders in general.

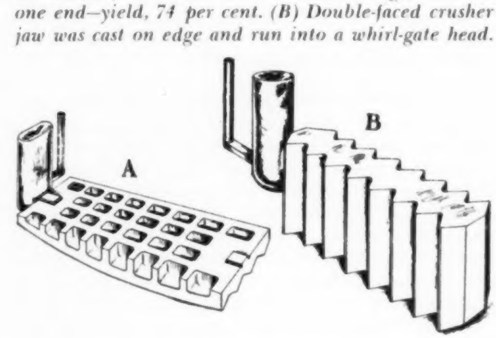
Due partly to the backlog of orders which is present almost without exception, and the paramount importance which is attached to production to the exclusion of other considerations, individual development of more advanced foundry technique in most cases has taken a back seat. To this must be added the fact that there is a natural tendency to be cautious with what appear to be radical alterations in accepted methods, especially since few of the local foundrymen have practical experience with these innovations.

Yield Relative to Other Factors

Before dealing with the actual methods of feeding castings it might be advisable to mention that certain of the examples mentioned in the text will show yields which are high according to some standards. To the author, who in Britain was associated with steel foundries manufacturing castings for high pressure applications—land and marine turbines and valves, the yield obtained in South African foundries was indeed a revelation.

The philosophy of "fitness-for-purpose" is practised in a very decided manner. In the general engineering industry a casting is expected to last as long as the particular plant of which it is a component. In the Union, many of the castings are used in mining applications, where they are subject to constant abrasion and require replacement at regular intervals, with a high degree of soundness and finish considered unnecessary.

Fig. 1—(A) Manganese steel crusher swing jaw casting is molded face down and run into a single head at one end—yield, 74 per cent. (B) Double-faced crusher jaw was cast on edge and run into a whirl-gate head.



If provision is made for extra feed metal to ensure a higher degree of soundness, the yield will decrease and the cost increase accordingly. Mining castings are sold on a highly competitive basis, and it is yet to be proved to the satisfaction of those concerned that the "extra" feed metal is justified in these applications.

Current Feeding Technique

The gravity head is the first choice of the majority of steel founders, with the old type flow-off head as a poor second. The question of neck design, in relation to mass effect, has not been given the attention which it receives overseas, and the tendency is to use large necks with disproportionately small heads. Apart from the consideration of mass effect, even with well designed gravity heads, one is always faced with reduced feeding efficiency, due to the adverse temperature gradients which are created by the use of this method.

While examples of whirl gates, atmospheric heads, and Washburn cores appear in the illustrations, the use of the more recently developed methods has not yet become general practice. Indeed, in many cases

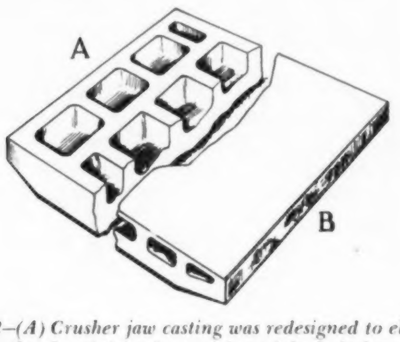


Fig. 2–(A) Crusher jaw casting was redesigned to eliminate the five internal cores in original design (B).

they are unlikely to be adopted in view of the yields obtained with the current technique, as is made clear from the illustrations.

The use of atmospheric heads where applicable could not be expected to show a marked improvement in the already high yields, but in the writer's opinion there are many instances where improvement would be effected in burning, grinding, and cleaning.

Basis for Comparison

A paper of this nature inevitably gives rise to comparisons, and it is therefore suggested that in examining the figures herein, the following considerations be borne in mind:

Inspection Standards: Given normal conditions the quality of castings is dictated indirectly and sometimes directly by the buyer. Inspection standards imposed by the customer result in fixing a level of quality, and raising these standards is unfortunately one of the few methods of ensuring the production of better quality castings. In South Africa the more searching methods of inspection and non-destructive testing are not used to any extent. Actually, there is only one foundry x-ray plant and, so far as the writer is aware, the industry possesses no magnetic testing apparatus.

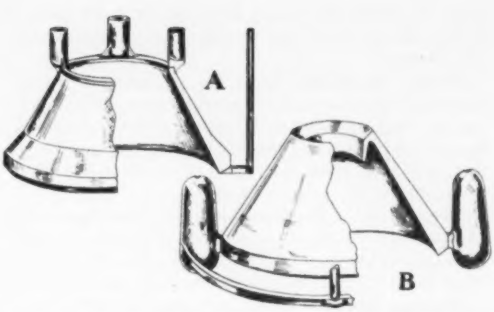


Fig. 3–(A) Five-foot mantle casting for gyratory crusher was run in the bottom flange and fed by gravity heads–yield, 77 per cent. (B) Mantle casting fed by atmospheric heads gives 75 per cent yield.

Pressure Castings: At present, castings for high pressure applications comprise a small and relative unimportant tonnage.

Welding: The widely accepted use of the welding rod is a habit which here, as elsewhere, tends to mask the pitfalls and uneconomic aspects of poor foundry technique, inadequate attention at the sample stage, and unduly high yields.

Technical Control: In recent years, managerial policy in America and Britain has resulted in increased technical development. A considerable amount of thought and planning is expended on the job before it reaches the production stage on the foundry floor. This system has as its object the elimination of the haphazard methods which were the outcome of individual planning of departmental operations without reference to the over-all picture.

Examples are legion where the pattern was made purely as a pattern, without consideration for feeding requirements, or reliability of location points for machine shop jigging; where the molder placed the heads in the ideal position from the foundry point of view, but where their removal gave rise to acid comments in the finishing departments; or even where the design gave everyone a headache, when perhaps a minor modification to the wall thickness would have meant easy prevention and not uneasy cure.

In few cases have these isolated individuals had the opportunity of gaining full knowledge of the ultimate function of the castings and/or consideration for the efficiency of the subsequent operations of finishing, grinding and machining.

Haphazard methods are disappearing in progressive foundries and the job is being considered in detail, from design to delivery, at the planning stage. Dependent on the experience of the individuals involved, pattern equipment is then supplied which will ensure maximum productivity from all aspects and, most important, which will result in a satisfactory casting from the functional standpoint.

In South Africa the gray iron and malleable sections o' the industry are more advanced in this respect, but there are signs that the steel foundries are awakening to the realization that ironing-out the difficulties before actual production, as far as possible, pays hand-

some dividends compared with the die-hard method which makes the job first and thinks about the difficulties afterward.

Market Conditions: Last, but by no means least, market conditions play a large part, as in a seller's market, such as exists to-day, customers are more willing to overlook the shortcomings of the castings on the basis that some castings, even with a few blowholes, are better than no castings.

The examples illustrated in this paper have been chosen from the classes of castings which are in greatest demand throughout the Union. An endeavor has been made to illustrate methods in general use, and contrasting methods which indicate the trend of developments in running and feeding technique.

Weights where shown are accurate, and yields, except where they refer to individual castings, are the results obtained over a representative range of castings of a particular type.

Crusher Jaws: There is a large and steady demand for crusher jaws in managanese steel. Figure 1A shows a typical swing jaw weighing 2,600 lb. The casting is molded face down and run into a single head at one end. In this instance the mold was placed on rockers before casting. The job was cast uphill and on completion of pouring, the partial reversal method was used and the mold rocked to position the head at the higher level. Gross casting weight was 3,500 lb, net weight, 2,600 lb, and yield 74 per cent.

Similar jaws are cast in many cases with the runner at one end and flow-off heads at the other end. Figure 1B illustrates a special double-faced jaw. To avoid having one working face in the top part, this was cast on edge and run into the whirl-gate head.

Instances do occur where the design of manganese jaws is such that it is difficult to avoid trouble in quenching. Figure 2 is a composite "before and after" sketch of an example where the marked variation in sections results in the setting up of contraction stresses, initially at the casting stage. Due to the low thermal conductivity of austenitic manganese the differentials arising in quenching frequently result in cracked castings. The jaw weighs 1,700 lb, and the original design (Fig. 2B) called for a casting with five internal cores surrounded by metal except at the ends. Section thickness on the working face was $3\frac{1}{2}$-$3\frac{3}{4}$ in., and $\frac{3}{4}$ in. on the back face.

The heavy face was cast down and apart from other considerations, the large flat face on the top, as cast, was liable to buckle or scab. The casting was redesigned (Fig. 2A) with balanced sections as far as permissible. The pattern was made to leave its own core and the internal oil-sand cores thereby eliminated. This proved a better method not only from the aspect of design but also in coremaking and setting, apart from the reduction in scrap.

Mantles: Large numbers of gyratory crushers are operated in the country which call for a regular tonnage of replacements in the form of mantles and concaves. Figure 3A shows a 5-ft mantle which is run in the bottom flange with one tangential ingate and fed by gravity heads on the top rim. This is the method in general use. The yield is 77 per cent, and a representative group of these castings gives a range of 75 to 85 per cent.

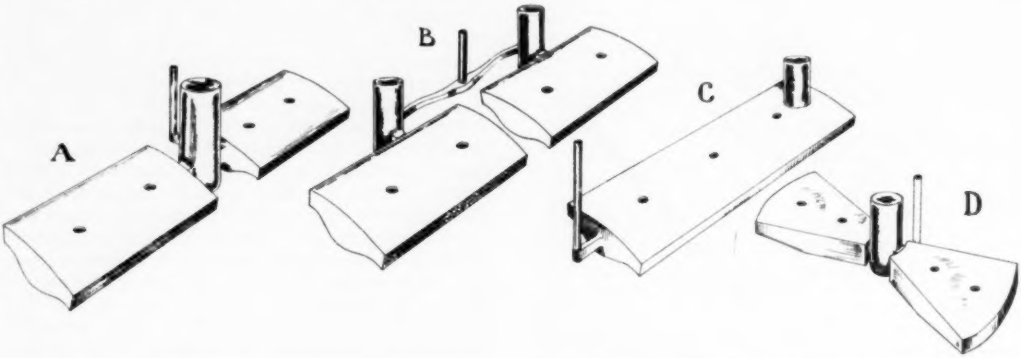


Fig. 4—(A) Two castings per flask are fed by central whirl-gate head—yield, 80 per cent. (B) Two side heads are used instead of center head, with consequent lower yield. (C) Ball mill shell liner casting is run in one end with head on top face—yield, 90 per cent. (D) Central whirl-gate head was used for ball mill end liner castings in this case. Usually, the head is taken off the top face of the casting.

Figure 3B is a departure from the accepted method and shows a mantle fed by atmospheric heads and run into these heads on the drag joint face. The yield was 75 per cent, and a slight improvement was effected in burning and cleaning costs.

This class of casting is not subject to other than dimensional checking on the ground faces, and the degree of soundness obtained in the thick section with top feeding is a matter for some conjecture, but again reverting to the "fitness for purpose" principle the customers appear to be satisfied with results.

Mill Liners: A great demand exists for mill liners in manganese, and to a lesser extent in chrome steel, for mines in the Union and Rhodesias. There represent one of the steady production lines in many of the local foundries. The majority are machine molded, the remainder made on the floor or in permanent molds.

Figure 4A shows one method where two castings per flask are fed by central whirl-gate head. Approximate weight per flask is 920 lb, yield 80 per cent.

Strange as it may seem, at times it is difficult to adopt this method as many of the tops for the larger flask parts have closely spaced heavy bars which make no allowance for heads of adequate diameter. These flasks must be suitable for a number of jobs which are repeated from time to time, and in few cases is it considered that special flask parts are justified. Removing the bars is unsatisfactory and in many cases inadvisable, and alternative molding methods are adopted which may be less efficient from the molding and yield aspects.

Figure 4B illustrates a case in point where two side heads were used instead of the center head. Naturally, this results in a lower yield.

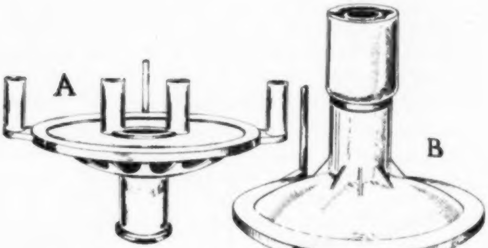


Fig. 5 (above)—(A) Trunnion end casting for ball mill was bottom run with flow-off heads taken off the main flange and fed with one large head—yield, 70-72 per cent.

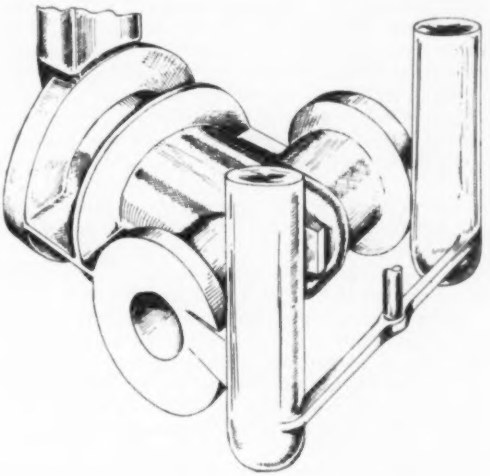


Fig. 6 (right)—Feeding of this small high-pressure valve casting is effected by a combination of whirl-gate and gravity heads—yields are 40-60 per cent.

Figure 4C shows a large ball mill shell liner weighing 1,900 lb. The casting is run in one end and a head taken off the top face, no core or other device being used to neck down the head. The yield is 90 per cent. These castings have been in regular production for some time, and according to reports give satisfactory service.

It should be mentioned that apart from the required abrasion-resisting properties, only two important points must be watched in this type of casting. Bolt-core centers must be reasonably accurate to line up with the holes in the mill shell, and the back face should be smooth and regular to give over-all contact on the shell and avoid rocking.

Figure 4D shows end liners for a ball mill. A whirl-gate head is used in this example, but the more popular method is to take a head straight off the top face of the casting. While yields are high and vary from 70-85 per cent, the latter method involves a fair amount of burning and grinding. In general, these liners fall in the category of "nice, lumpy jobs". As a means of taking a heat from the furnace with the minimum expenditure of time and productive effort, they would be hard to beat.

Tube and Ball Mill Ends: Among the larger castings, there is a steady demand for ball and tube mill ends. Generally, these are machined on the outside diameter of the trunnion and on the bolt faces of the large flanges. The usual method is to mold with the trunnion down. In the cored, or starfish type, this obviates the necessity for hanging the large segment cores in the top part, and assists in more efficient feeding.

On the other hand, this method can result in hot tearing round the perimeter where the trunnion runs into the main flange. Where the flanged end is plain and the metal sections suitable, the mold can be made with the trunnion in the top part, with a single head feeding down through the boss.

Figure 5A shows a starfish trunnion end for an 8 ft ball mill, weighing 8,300 lb net. The casting is bottom-run into the trunnion, with four flow-off heads taken off the main flange and two round heads off the top of the boss. This gives a yield of 80 per cent. Figure 5B illustrates a plain dished end for a 5½-ft tube mill, and here the job is cast with the trunnion on top, run tangentially into the main flange and fed with one large cylindrical head on the trunnion. The net weight was 6,200 lb, and the estimated yield 70-72 per cent.

In passing, it is interesting to note that the upward force tending to displace the top part is much greater with this method than with the method shown in Fig. 5A.

No mention has yet been made of cracking ribs, but it will be appreciated that these are cut in the mold at sections where hot tearing is liable to occur.

High-Pressure Castings: So far, castings for high-pressure applications have not been produced in large quantities, but there is a steady if small demand for assorted castings such as valves, chests, pump parts, and bends. In this particular field, the gray iron market is much more extensive, to meet the requirements of waterworks and municipal authorities.

Figure 6 shows a small high-pressure valve which is molded in the orthodox manner. Feeding is effected by a combination of whirl-gate and gravity heads, due

attention being given to padding of the feeder-necks. Obviously, the high yields on the castings already described are not obtainable in this instance. Representative castings in this category give yields of 40 to 60 per cent depending on size and section thickness.

For these castings gravity heads are still the choice of most foundrymen. The dangers attached to the indiscriminate use of atmospheric heads has been demonstrated in some instances where they have been tried. The difficulties, in the main, arise from insufficient appreciation of the importance of feeder-neck size and position, and the necessity for adequate padding to promote directional solidification.

Gear Wheels: All shapes and sizes of gear wheels are made locally by methods which are in line with overseas practice. Cast teeth are used for agricultural and other gears where a high precision finish is considered unnecessary. Incidentally, there is only one machine in the country capable of cutting the teeth on the large spur gears required for ball and tube mill final drives.

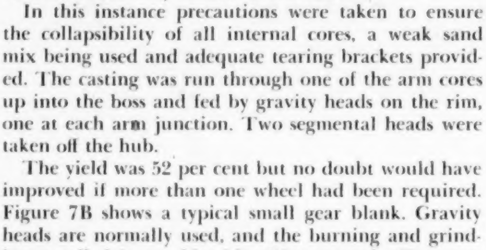
Figure 7A shows a typical "H" arm wheel blank for a double helical drive, with a 43-in. outside diameter and weighing 1,100 lb net. Here again, the customer is naturally more exacting and expects a sound job, free from tears and shrinkage cavities.

The problems associated with this type of casting are by no means confined to achieving soundness. Steps must be taken to prevent the formation of hot tears and to minimize the setting-up of contraction stresses which may result in fracture.

In this instance precautions were taken to ensure the collapsibility of all internal cores, a weak sand mix being used and adequate tearing brackets provided. The casting was run through one of the arm cores up into the boss and fed by gravity heads on the rim, one at each arm junction. Two segmental heads were taken off the hub.

The yield was 52 per cent but no doubt would have improved if more than one wheel had been required. Figure 7B shows a typical small gear blank. Gravity heads are normally used, and the burning and grinding entailed is considerable. The example illustrates the use of atmospheric heads as an alternative. In some cases one head is sufficient to feed the rim, but with increase in diameter and weight, an extra head may be required. This method has proved successful, and the yield over a series was 50-70 per cent.

Fig. 7–(A) Wheel blank casting for double helical drive gear was run through one of the arm cores up into the boss and fed by gravity heads on the rim–yield, 52 per cent. (B) Small gear blank casting was fed by atmospheric head–yield is 50-70 per cent.



Railway Castings: The railways, directly and through sub-contractors, purchase more steel castings than any other single organization in the Union. At times the quantities justify mass production methods. Among the castings which have been required in bulk are coupler casings, checkrail chairs, baseplates, bolster centers, drawbar yokes and knuckles. Figure 8A shows the drawbar yoke, which weighs 213 lb. This casting is subject to railway inspection and must conform to approved jigs and templates.

The section is fairly uniform throughout and the usual practice is to run into the bottom jaw. Very little feed metal is used, and the gross weight, which varies from foundry to foundry, ranges from 260 to 280 lb, giving a yield range of 76 to 82 per cent.

Figure 8B illustrates contrasting methods of making buffers, which are fitted to certain types of rail trucks. The end is cast square and subsequently drawn out to the finished size by forging. In the more popular method (Fig. 8B1) the job is cast on end, run in the bottom flange and fed by a gravity head. The yield is

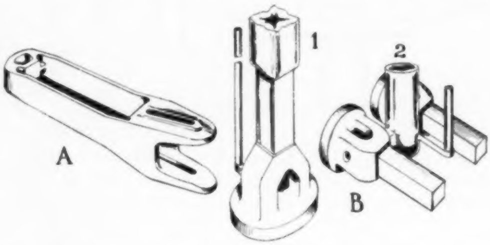


Fig. 8–(A) Drawbar yoke railway castings are usually run into the bottom jaw–yield, 76-82 per cent. (B1) Buffer casting is cast on end, run in bottom flange and fed by gravity head–yield, 70 per cent. (B2) Two buffer castings per flask are machine molded and run into a central head–yield, 69 per cent.

approximately 70 per cent as the height of head varies. In the alternative method (Fig. 8B2) two castings per flask are machine molded and run into a central head. With this method the yield is 69 per cent.

Trackwheels: A seemingly endless variety of trackwheels are produced, from the humble coco-pan wheel upward. There is an extensive market for railwheels from 12 to 18 in. in diameter, which are used as-cast except for boring and facing to take the axles. Machine and hand-plate molding is employed using match- and double-sided plates.

Figure 9A shows an 18 in. railwheel which is machined on the tread, bored and faced. Two whirl-gate heads feed the rims, but given suitable tops one central head of adequate size would have fulfilled the purpose more efficiently. These wheels must be sound and free from blemish on the tread, as during service any defect soon develops into a flat which mitigates against the efficient running and life of the wheel.

The gross weight per flask is 680 lb, net weight, 350 lb, and the yield 51 per cent. Figure 9B shows the method in general use for wheels of this type. Yield in this case is 63 per cent.

It is obvious that most of the methods described

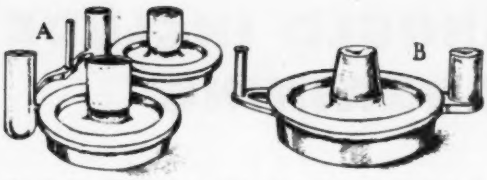


Fig. 9—(A) Two whirl-gate heads feed the rims of these 18-in. railwheels which are machined on tread, bored and faced—yield, 51 per cent. (B) Feeding method in general use for type of wheel shown—yield, 63 per cent.

herein have been derived from well established overseas practice, and in certain instances will be considered outmoded. Environmental conditions peculiar to the country have developed in the South African foundryman the flair for improvisation, the capacity to make the job despite the facilities. In this respect he need bow the head to no man.

Conclusion

While the specialist from perhaps more enlightened lands may point the finger at realms where improvisation still leaves its large and somewhat untidy footprints, it should be remembered that the process of evolution operates not only on the organic but also on the industrial level.

The industry as a whole cannot fail to benefit from the adoption of more advanced methods. Nevertheless, there will be regrets at the passing of a phase, among individuals whose brains and wits have grappled and developed in the solving of problems which, under more propitious circumstances, would not have arisen.

What the future holds for the local steel foundries depends largely on the attitude of the consumer industries. If the prevailing emphasis on price continues, with quality as a secondary consideration, technical development is bound to be retarded until a change of outlook occurs on the part of founders and buyers.

Comparatively few of the local foundrymen have had the opportunity to gain firsthand experience of American methods, but the enlightened attitude toward progressive change, which is an outstanding characteristic of the American founders, is an example to all, and as such merits the appreciation of foundrymen the world over.

Grateful acknowledgment is made to the South African foundrymen who provided the opportunity to collect the data contained in this paper.

TEXAS REGIONAL

(Continued from Page 37)

Mr. Bowers summarized recent ACIPCO investigations relating to electric furnace melting, manganese control through slag viscosity measurements, relation of pinholing tendency to silicon content, influence of aluminum residual in ferrosilicon, silicon as an alloying agent, and influence of traces of hydrogen on porosity and embrittlement.

The new color-sound film on fluid flow, with Technical Director Massari as commentator, continues where the original film leaves off. Using the earlier work as a foundation, the latest film further develops gate shapes and sizes and shows how the recommended practices eliminate air aspiration through the mold, air entrainment at the bottom of the sprue and at ingates, and promote uniform metal distribution in a multiple-gated casting.

Mr. Ball gave typical ranges of yields for copper-base alloys. Foundrymen not achieving satisfactory results, he said, should over-gate and over-riser using standard techniques to produce sound castings. Gates and risers should then be reduced as much as possible.

Three simultaneous group meetings were held in the late afternoon of the second day. At a steel session E. A. Brandler, Electro Metallurgical Div., Union Carbide & Carbon Corp., Birmingham, Ala., spoke on *"Current Alloy Practices for Steel Castings."* Presiding was Burt Reynolds, Texas Steel Co., Ft. Worth. Mr. Brandler described good practices for conserving alloys and outlined a new melting technique for the production of extra-low-carbon stainless steel.

At the final gray iron session, W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va., spoke on the fundamentals of cupola practice. He described use of various types of fuel with particular reference to melting temperature and carbon control. Chairman was John Kimes, Lufkin Foundry & Machine Co., Lufkin.

R. A. Colton, Federated Metals Div., American Smelting & Refining Co., Barber, N. J., spoke on *"Melting Practice and Gases in Non-Ferrous Metals"* with Jake Dee, Dee Brass Foundry, Houston, presiding. Nitrogen, the hydrocarbons, carbon dioxide and carbon monoxide have little solubility in copper-base alloys in the liquid state, said Mr. Colton. Offenders are oxygen and hydrogen which have appreciable liquid solubility in most of these alloys and can also be present in the solid state, Mr. Colton said.

Speaker at the banquet concluding the First Texas Regional Foundry Conference was Dr. Harold Vagtborg of Southwest Research Institute. American industry is in a period of organized research and is spending almost $1 billion a year on investigations, he said. In period of competition between industries, he urged foundrymen not to let other industries outdo them.

W. H. Lyne, Hughes Tool Co., Houston, presided, and presented a gift from the Texas chapter to its immediate past chairman, C. R. McGrail, Texaloy Foundry Co., San Antonio. Awarded at the banquet were the first Texas chapter scholarships. Marvin W. Williams, Hughes Tool Co., made the presentations to two senior engineering students, Lloyd Howerton, Texas University, and Fred Maxwell, Texas A. & M.

Texas chapter members who arranged the conference were: *conference co-chairmen*, J. R. Hewitt, Houston, and Walter J. Temple, Kincaid-Osborn Electric Steel Co., San Antonio; *arrangements*, C. R. McGrail, Texaloy Foundry Co., San Antonio, chairman, Mr. Temple, Howard E. Bergendahl, and R. H. Glenney, Alamo Iron Works, San Antonio; *publicity*, P. B. Croom, Houston Pattern Works; *finance*, Marvin W. Williams, Hughes Tool Co., Houston; *registration*, Edw. W. Wey, Dee Brass Foundry, Houston; *attendance*, Gerald J. Smith, East Texas Electric Steel Co., Longview; and *program*, Mr. Hewitt, and Jake Dee, Dee Brass Foundry. Conference photographer was Past National Director F. M. Wittlinger, Electric Steel Casting Co., Houston.

SAND CONTROL SHOULD INCLUDE MIXER OPERATOR TRAINING

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Two steps in the direction of uniform sand mixtures of maximum workability can be taken in any foundry which will convert to an all-purpose sand mixture and which will give proper attention to selection and training of the man who mixes the sand.

In many foundries, sand mixtures are gradually being reduced to a single all-purpose variety. Several mixtures are difficult to keep separated in distributing systems, and after shakeout are even more difficult to keep segregated. The all-purpose sands simplify mixing and lend themselves readily to somewhat inexperienced craftsmen. With a given mold hardness as a guide, the novice molder can turn out satisfactory molds by machine provided he receives the sand in usable condition. There is no time and in many instances insufficient skill to change practice to overcome inferior sands at the point of mold production.

The author's foundry, a gray iron jobbing shop, experimented for several years in an effort to secure one simple sand mix that would give satisfactory results on its many different machines and floors. The final goal was a sand that would go well with new molders, be free from burning-in, and produce castings true to pattern. During the early stages of development, the all-purpose sand peeled nicely from light work but burned-in excessively on heavy castings. A shift to a larger grain size resulted in better finish on big castings but the reverse was true of the small jobs.

Finally, a silica sand was selected having resistance to heat and shock, and having a grain fineness permitting high permeability with sufficient fines to promote excellent casting finish. Sieve analyses of the base sand and the system sand are shown below.

All-Purpose Silica Sand	% Retained	System All-Purpose Sand	% Retained
On 6 Mesh	0.0	On 6 Mesh	0.0
On 12	0.0	On 12	0.0
On 20	0.0	On 20	0.8
On 30	0.2	On 30	1.6
On 40	0.4	On 40	6.8
On 50	2.1	On 50	16.4
On 70	8.3	On 70	25.5
On 100	29.4	On 100	22.0
On 140	43.2	On 140	15.4
On 200	13.4	On 200	3.7
On 270	2.2	On 270	0.4
On Pan	0.8	On Pan	0.4
Total	100.0	Total	93.0
Clay %	0.0	Clay %	7.0
Fines %	16.4	Fines %	4.5
Dist. on 3 Adj.-Screens:	86.0	Dist. on 3 Adj.-Screens:	63.9
AFS Fineness	65.0	AFS Fineness	62.0

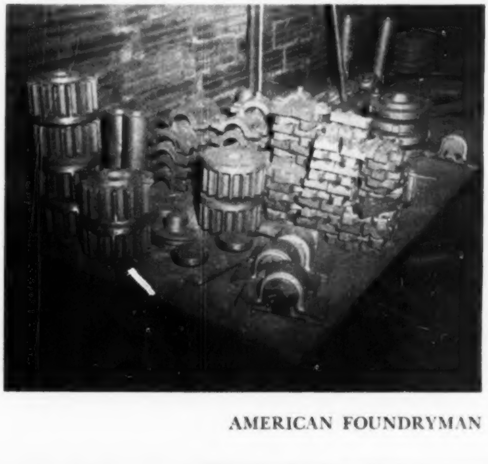
Grain distribution of the system sand differs from the base sand, although fineness numbers are essentially the same, because of the inclusion of core sand at the shakeout. Core sand used is about 12 per cent of the weight of the molding sand. The base sand used for the all-purpose molding mixture is used in 85 per cent of the cores. Balance of core requirements, for the heavier cores, is met with a mixture which is half base sand and half coarse sand shown in the following table.

		% Retained
On	6 Mesh	0.0
On	12 Mesh	0.0
On	20 Mesh	0.0
On	30 Mesh	2.8
On	40 Mesh	8.2
On	50 Mesh	20.4
On	70 Mesh	26.4
On	100 Mesh	27.0
On	140 Mesh	11.0
On	200 Mesh	2.6
On	270 Mesh	0.8
On Pan		0.4
Total Screen		99.6
Clay		0.4
Fines		3.8
Dist. on 3 Adj. Screens		73.8
AFS Grain Fineness		60.0

On very massive cores, a dried river sharp sand with large grains is sometimes employed to give venting in the center, thus further altering the grain distribution in the system sand.

The system all-purpose sand is bonded with bentonite. Pitch, seacoal, wood flour, and cereal flour are also regular additives. The sand described here has been used with success for years in this particular shop. All

A small castings group ranging in weight from one to 20 lb were produced in all-purpose sand molds.



mechanically rammed molds are run green, but the sand is sometimes torch dried on exceedingly heavy work which has been hand rammed.

The all-purpose mix when used on molds containing very thick section castings must have a muller addition of clay to bring total clay content up to or above 7.0 per cent. On this work pitch, seacoal, cereal and perhaps wool flour are correspondingly high in relation to other mixes. Moisture is run at a higher level with increased clay, and the mulling cycle is set to give green strengths of 8.0-9.0 psi. On medium work the additions are cut in half, and for very light castings, no additives are necessary at mixer, as enough carry-over material is present in the heap.

An all-purpose sand should be a blend of sand grains with a four or five screen spread, a high refractory or sintering quality, and an A.F.S. fineness, generally speaking, of 60 to 80. The wide grain distribution adapts itself readily to every pattern application. The finer the grain the better the surface finish—up to a point where venting is impaired, which must be ascertained by experiment. A high refractory grain must be employed to withstand repeated usage with the smallest amount of breakdown into fines.

Sets Mixing Standards

The advantages of an all-purpose sand are especially pronounced in the mechanized jobbing or production shop. A minimum of confusion results in sand destined to different molding stations and return and new sand storage problems are greatly eased. After the correct base sands are obtained in core and molding sands, standards of mixing must be set up. The muller operator should be briefed daily and be familiar with current production.

The author believes that an all-purpose sand formula could be devised and profitably used in nearly every foundry. Of course, no one mix would meet universal requirements. Native sands, class of work, and methods of production in various foundries make each locality an individual problem.

Despite tremendous strides in mechanization the human element still plays an important role in the proper mixing of core and molding sands. Nevertheless, the best man for the job is often not assigned to this important part of the production of salable castings. The man entrusted with the responsibilities of mixing sands should be developed through careful selection and intense training.

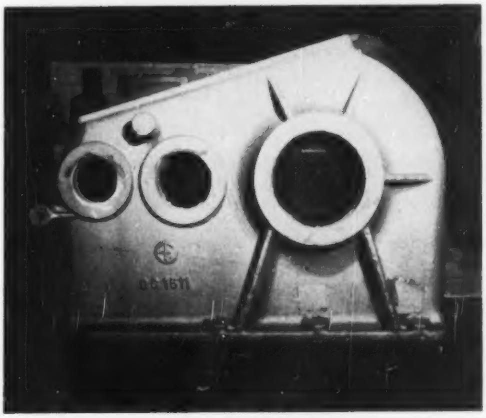
Many foundries have hired sand technicians and installed well equipped laboratories to safeguard production with daily routine tests. This is a forward step but without the cooperation of a skilled mixer operator, the best mixes on the chart, the standardized efforts of molders and coremakers, may result in heaps of scrap. Scrap due to poorly mixed sand is sometimes difficult to assign to this cause.

A poor man on the sand mixer can waste many dollars through indiscriminate use of expensive additives to core and molding mixes. Adjusting to a slightly longer mulling cycle will usually result in a definite saving of bonding material, and simultaneously produce superior sands. Either too small a bond addition or too short a mixing cycle promotes low green compression strength which invites drops, cuts, washes, and may well contribute to the scrap percentage through an epidemic of dirty inclusions.

A shortened mixing time with rich bonding may indicate sufficient green strength in routine sand examination, but the minutes saved can be expensive indeed. Added expense has gone into the batch, and very likely the quality of the castings will be inferior due to lack of uniformity in the short-cycle sand.

Good Judgment Required

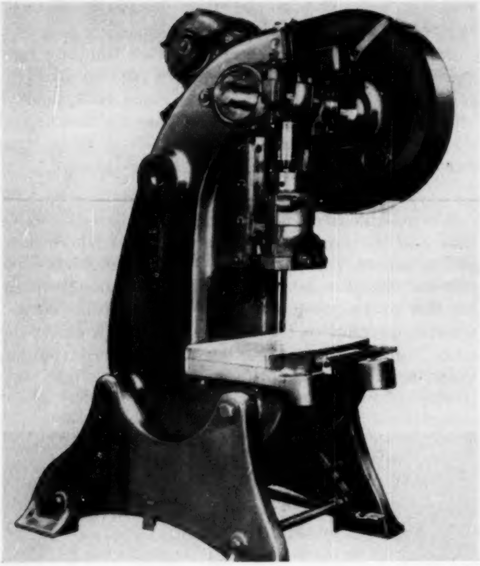
It is possible to over-mix sand, thus wasting valuable time and stiffening the batch to a point where flowability suffers, and the coremakers and molders have extreme difficulty in ramming. The sand mixer operator has to be the on-the-spot judge of the correct amount of water to use for proper temper unless the sand is supplied dry or at controlled moisture content. Water costs little in itself but its unwise use may turn out to be expensive. Our practice indicates that excessive moisture may cause low flowability, which results in a burning-in condition with swells and blows.



A 700-lb gray iron gear reduction housing casting produced in a green sand mold with all-purpose sand.

In spite of all the safeguards afforded by automatically weighed charges of sand and additives, and water meters, the mixer operator is the balancing factor. All the controls of the sand system will not safely allow the operator to become an automaton. These push-button devices will not guarantee good results without the application of the trained workman's intellect and basic know-how.

Foundries with outstanding sand practice can still make good use of a well-trained man on the sand mixer. Sand may be purchased with predetermined fineness and grain distribution and delivered graded and dried. Regular sand tests may be part of the control program of the foundry. The sand system may take most of the guesswork out of sand conditioning. But in a jobbing shop producing castings weighing from a few ounces to several tons, all molded in the same base sand, and subsequently shaken out and the sand transferred to a common storage tank, the sand in any given



The punch press assembly contains castings weighing from 300 to 3900 lb, made in all-purpose sand molds.

batch may be burned out, hot and lifeless, or relatively cool with a little leftover temper.

It is these unusual mixer loads that call for judgment on the part of the operator. By close examination during the first few seconds of mixing he can determine its condition and adjust his additions accordingly.

Molding sands are more treacherous to mix than core sands. The mixing charts for core sands are relatively easier to follow and new sands generally make up the batches. With the base sands nearly the same each day in moisture and temperature, and with no previous subjection to heat, proper attention to measuring additives and a faithful eye on the mixing cycle clock should give uniform results with little variation.

However, core sands, whether paddle mixed or mulled, require skill in preparation. The core room foreman makes a costly mistake when he selects a sand mixer operator purely on the basis of the operator's ability to crowd tons of sand through the machine.

Perhaps a more rigid program of selection and thorough training of sand mixer operators is what is needed in countless foundries, large and small. Much attention has been given to the improvement of metals and methods of making cores and molds. Defective castings traceable directly to metal and other factors are vigorously studied and the trouble is usually brought under control with the least possible delay. However, much scrap directly attributable to sand conditions is shrugged off as one of the unpredictable elements connected with production of castings.

Since the larger number of employees in a foundry work more with sand than any other material, the mixing of this material is too important to be overlooked. Top notch equipment selected to meet each foundry's needs and highly specialized personnel to run the machines with proper sand and binders are the ultimate solution to sand troubles.

Yesterday's era in the foundry posed no sand mixing problems such as exist today. The tempo of production was comparatively slow. A large segment of the industry worked on the theory that each molder should mix his own facing, put up his molds with or without the aid of a helper, stop in time to pour metal, shake out, and then cut back his heap sand for the next day's production. Each mechanic learned the best mix, irrespective of material costs, for his own abilities and class of molding at hand. Few of these individualized facing mixes would stand the test of today's higher temperature metal, or be adaptable to scores of craftsmen for group molding techniques.

With the acceleration in production, the foundry industry quickly became aware that the molder's time should be spent making molds. The change from each molder being a one-man-foundry has been healthy. The sands produced today by one man may not always please all the molding station units, but overall better results are attained.

Since it appears that machines will never completely displace men in the foundry, the mixer operator should be carefully selected and trained to fill his position. He should have a foreman's classification and should be a regular attendant at scrap meetings. He should be given proper hearing in any proposed changes in mixtures. He is one of the important working links between the testing laboratory and the finished product.

CANADIAN REGIONAL—

(Continued from Page 43)

registration, F. J. Rutherford, Refractories Engineering & Supplies Ltd., Hamilton, and Russell C. Vollick, Canadian Westinghouse Co., Ltd.; *sand course,* Alex Pirrie, Gurney Dominion Furnaces Ltd., Toronto, and Willard A. Jones, Canadian Westinghouse Co., Ltd.; *housing,* Russell A. Woods, Geo. F. Pettinos, Ltd., Hamilton, and Robert W. Cross, Hamilton Foundry Co.; *program,* Arthur G. Hawthorne, Canadian Foundry Supplies & Equipment Co., Toronto, and O. A. Davies, Canada Metal Co. Ltd., Toronto.

Others included: *plant visitations,* W. H. L. Bryce, International Harvester Co. of Canada, Hamilton, and Robert Hetrick, Metals & Alloys Ltd., Toronto; *banquet,* Mr. Williams, and M. W. Holland, General Smelting Co. of Canada, Hamilton; *publicity,* G. R. Winkworth, Toronto Foundry Co. Ltd., Frank B. Diana, Z. Wagman & Sons Ltd., Toronto, and A. Reyburn, Cockshutt Plow Co. Ltd., Brantford; *entertainment,* Jack Richardson, Wm. R. Barnes Co. Ltd., Hamilton, and Don Barnes, Don Barnes Foundry Supplies & Equipment, Hamilton; *advisory,* James Dalby, Wislon Brass & Aluminum Foundries, Toronto, J. A. Wotherspoon, J. A. Wotherspoon & Son Ltd., Oakville, and J. H. King, Werner G. Smith, Ltd., Toronto; and *banquet speaker,* Murray N. Tallman, A. H. Tallman Bronze Co. Ltd., Hamilton.

Plants open for visitation were: Dominion Foundries & Steel, Ltd., A. H. Tallman Bronze Co. Ltd., International Harvester Co. of Canada, all of Hamilton, and the "M" Foundry of Massey-Harris Co., Ltd., Brantford.

WESTERN EUROPEAN PRODUCTIVITY TEAMS VISITING U.S. FOUNDRIES

Now in the United States on extensive tours of foundries and related metals fabricating industries are two productivity teams—one from France, under the auspices of the Economic Cooperation Administration, and the other, representing eight Western European nations, under the sponsorship of the Organization for Economic Cooperation.

American Foundrymen's Society, in cooperation with the Steel Founders' Society of America and the Malleable Founders Society, has arranged a comprehensive tour of U. S. foundries for the 20-man French Steel and Malleable Iron Founders Productivity team.

Workers, Executives on French Team

Comprising both foundry workers and top executives, the French team is made up of specialists, each of whom will observe American methods in his particular phase of foundry work. This has been taken into account by A.F.S., SFSA, MFS and ECA officials in planning the team's itinerary, which will embrace as many steel and malleable founding operations as possible. Members of the 20-man team are:

Louis DesPlanche, molder, Fonderies du Creusot au Creusot, Saone & Loire; Maurice Fleur, technician, Acieres d'Hirson a Hirson, Aisne; Jean Fontaine, foreman, Acieres de Paris & D'Outreau, Paris; Athos Gantois, foreman, Acieres de Sambre et Meuse a Feignes.

Jacques Genot, general manager, Acieres et Fonderies du Doubs; Marcel Jaumain, engineer, Fonderies et Forges d'Alais—Usines Metallurgiques de Tamaris a Tamaris; Adolphe Luchetta, head of division, Syndicat General des Fondeurs de France; Gaston Martin, manager, Usines & Acieres de Sambre et Meuse a Feignes; Louis Mathieu, molder, Fonderies et Forges d'Alais a Tamaris.

Michel Pelier, molder, Acieres & Fonderies du Doubs a Ste. Suzanne; Robert Perrot, engineer, Acieres de Paris & d'Outreau a Outreau; Jean Rible, division engineer, Fonderie Le Creusot au Creusot; Rene Robert, foreman, Fonderies et Forges d'Alais a Tamaris; Georges Bachelet, molder, Fonderie des Ardennes.

Guy Brisville, general manager, Brisville a Nouzonville, Ardennes; Georges Daugenet, engineer, Fonderie des Ardennes a Mezieres; Rene Dias, manager-owner, Fonderies Dias a Coudekerque-Branche; Andre Gaypaud, engineer, Ste. d'Aubrives & Villerupt a Villerupt; Michel Louis, molder, Ets. Cailly a Charleville; and Andre Servonnat, engineer, head of division, Societe Senelle Maubeuge a Maubeuge.

Aluminum Team Represents Eight Nations

Comprising the second productivity team now visiting the United States are 17 members of the aluminum industry from eight western European nations. This team is studying secondary aluminum operations in this country with the idea of economizing on virgin aluminum consumption in Europe by a more exhaustive study of secondary aluminums. Representing aluminum smelters, foundries, die casters and other fabricators in England, France, Belgium, The Netherlands, Western Germany, Austria, Greece and Ireland, the mission is under guidance of S. J. Gross of England, secretary of the Non-Ferrous Committee of the Organization for Economic Cooperation.

French Steel and Malleable Foundrymen Tour U. S.

Shown in New York just before boarding a plane for Cleveland on a month-long tour of United States sponsored by the Economic Cooperation Administration were these 24 members of the French steel and malleable iron industries. Included in the group are N. C. Louis, A. K. Gayrand, R. E. Dias, D. A. Daugenet, G. L. Brishille, G. A. Bachelet, R. E. Robert, N. C. Saulnier, J. A. Duval, J. C. Burppi, J. B. Roble, M. L. Pelier, L. H. Mathieu, R. B. Perrohm, L. G. White, L. C. Des Planche, J. B. Fontaine, M. N. Fleur, A. A. Gantois, J. C. Genot, N. L. Jaumain, A. J. Luchetta, F. E. Martin and A. J. Servonnat. (Photographed by courtesy of United Air Lines.)

EXPAND FOUNDRY COMPETITIVE POSITION THROUGH BETTER PERSONNEL TRAINING

Donald F. Lane
Chairman
A.F.S. Foreman Training Committee

AIM OF AN EFFICIENT FOUNDRY operation is to make quality products that will meet customers' delivery requirements at prices they can afford and are willing to pay. This is only possible through effective management that is alert to improve production facilities, work methods, supervisory effectiveness, employee relations, financial position, and marketing possibilities.

Today, no company or country in the world has any priority on production methods, up-to-date machinery, technical skills, or professional leadership Many companies possessing the best machinery, materials, know-how, plant location, etc., have seen their wages go up and production go down. More manpower is added while less goods are manufactured. Somewhere, management has failed to utilize its human resources effectively.

Training of foremen to fulfill their responsibilities, together with the training of the employee to utilize machinery, technical skills, and modern know-how, are going to become the differences in the competition of tomorrow. No foundry or company can hope to solve its problems unless progressive management is exercised. The development of progressive management involves the improvement of present managers and the training of future managers.

Company Survival Relies On Personnel

With great strides being made in technology, science, production methods, humanics, and group relationships, management is becoming more difficult. As a consequence, the manager of tomorrow must be better educated and better trained than his predecessor. The degree to which a company survives future competition will be in direct relationship to the competency of its personnel.

Foundry managers should be interested in all aspects of modern industrial management—whether it be finance, marketing, production, or personnel. This interest can be stimulated by participation in business and professional societies, writing magazine articles, reading a variety of current books, inspecting other business establishments, and inviting other industrialists and management consultants to observe operations and exchange views on improving products. Progress in any company is usually made on the basis of wise management decisions. Training in its broadest aspects will increase knowledge and make for more open-mindedness.

Identifying and developing potential managers is one of the most important functions of any management. A company can only perpetuate itself by continuing to attract, hold, and develop young people with high potentialities. The responsibility for recruiting, selecting, placing, inducting, training, follow-up, and upgrading of personnel should be delegated to one or more full-time executives with the authority to formulate a long-range policy of personnel development.

Because management and workers are in many instances the same people at different stages of their careers, more emphasis should be placed on the selection and improvement of personnel. Psychologists tell us that production in the average company could be augmented at least 10 to 20 per cent by merely placing the right person on the right job. Many foundries are giving meticulous attention to the use of aptitude, intelligence, interest, and psychologist tests as guides in selecting employees.

Personnel Tests Pay Dividends

Naturally, test scores are correlated with the findings of previous school training and possible work experience, not to mention the results of the interview itself. In one instance turnover was reduced from 42 to less than 5 per cent over a period of 3 months, and production was increased about 40 per cent because objective methods were used in molding "employee profiles" to match established "job profiles." It was also estimated that at a cost of $200 per employee separation, $8400 was saved through this personnel selection method.

The aim of any progressive industrial organization, from a profit point of view, should be to place employees where they can operate at top potential. Where possible, new employees should be given work assignments that are compatible with their previous training and experience.

Job Assignments To Fit Aptitudes

To illustrate, an all-around molder should be assigned to work that would involve the operation of various foundry tools, use of numerous pieces of equipment, reading of blueprints, etc. Under assignment of employees only contributes to psychosis, frustration, and inefficiency. Job descriptions and mechanical aptitude tests are invaluable in starting employees at the proper level.

After the new employee has been properly selected and placed according to his interests, physical ability, and aptitudes, the next important function is to get him off to the right start by exposing him to a systematic procedure of induction. The plant superintendent should welcome the new employee into the organization and introduce him to his foreman, who

should explain in some detail the various policies, rules, regulations, rates of pay and union agreement, if one exists.

In large companies where many people are employed or where a plant is being expanded, new employees are given group instruction by a personnel officer. In some instances films and booklets are used to supplement employee information. Next, the various products and job contracts should be explained so that the new employee is made aware that he is part of a team. Every player on a team will do his part better if he understands the rules of the game.

So a person will see the relationship of his job to the whole, it is recommended that the foreman take the new employee on a conducted tour of the entire plant, explaining various processes and pointing out safety measures. Departmental offices, personnel, first aid, eating facilities and the like should be visited. At the expiration of the tour he should be introduced to his fellow employees and then trained in the discharge of his duties. Getting a new employee off to the right start will later pay rich dividends.

Plan Individual Work Careers

Management personnel, from the first-line supervisor to the president, is responsible for the development and effective utilization of all branches of personnel within an organization. Naturally, a sound pattern for implementing such a program must be developed, approved, and supported by all gradations of management. The work career of every individual should be planned and directed from induction to separation. Every effort should be made to satisfy the desire of a normal individual to develop to the utmost of his ability, consistent with available opportunities.

Many foundries in this country are getting a high degree of productivity per employee-hour by reviewing the physical condition, performance profile, training and personal relations of each employee every 6 months. To make the evaluations as objective as possible, they are usually made by the employee's immediate supervisor, personnel officer, and department superintendent.

Employees fall into three classifications: (1) below average; (2) average; and (3) above average. Employees not measuring up to standard are given the benefit of counsel. If a man's efficiency is impaired because of poor health, he is advised to check with the plant doctor or consult his personal physician. In some instances the employee has been assigned additional responsibility and lacks training for the job. Other circumstances may warrant a change in work assignment of the individual.

The records of employees classified as average are scrutinized closely to ascertain if any have dropped back one classification or have had extraordinary training and experience on a specific work assignment and should have been classified as above average.

Employees classified above average have demonstrated that they possess ability and show promise for further development. If an employee has mastered one particular job or operation that is an integral part of an occupation or trade, it is possible that his future progress can be forecast and a target position selected. For example, if an employee in a short period of time has evidenced exceptional proficiency in cupola charging, sand conditioning, or metal pouring the review committee may select the learning of the foundry trade as the target position.

The next step will be to determine what the employee needs in the way of development to qualify him as a first-class molder. First, a series of lateral and vertical job experiences will be charted for the next 6 months and might include such assignments as working in the core room, conditioning sand, side-floor molding, pit molding, etc.

Certain related information should also be acquired, such as blueprint reading, mathematics, and shop

Periodic meetings of foremen of Caterpillar Tractor Co., Peoria, Ill., do much to iron out knotty problems by correlating efforts of departments concerned.

theory. Frequently this type of training is available in the local evening school or through correspondence instruction. Large companies employing hundreds of craftsmen operate in-service apprenticeship programs in which shop training is correlated with instruction by full and part-time instructors.

If the employee continues to develop and grow through organized work experiences that have been projected for a 6 month period, other series of work assignments should be scheduled until such time as the employee is thoroughly qualified to assume all the responsibilities of the target position.

If for any reason the employee does not continue to develop according to plan, he will probably be classified as a limited-range craftsman. It is also possible that the employee has reached his top potential. However, every effort should be made at each review period to give further consideration to such a development pattern.

Some of the best foremen, department heads, superintendents and foundry managers were originally recruited from the regular work force. Making a periodic audit provides a company with an inventory of men with management potential who can be given

assignments that fit them for greater responsibility. For instance, if a molder in a steel foundry were of foreman caliber, he might be scheduled to work in the engineering, pattern, machine shop, or metallurgical departments because his future supervisory responsibilities may involve the execution of decisions that pertain to such factors as equipment design and methods of product operation.

By receiving such a broad background, a foundry shop foreman is better able to plan and expedite his work. In many maintenance shops costs are excessive and cut heavily into profits because of costly technical mistakes that are frequently attributable to supervisors who lack broad industrial experience and technical skill.

Engineering Graduates and the Foundry

Technical engineering graduates are also a good source from which to select and develop future management people. Many foundries make an effort to select a minimum number of college graduates every year. Usual practice is to interview the applicant at the plant office. However, better selections are obtained where management representatives visit the college or university and discuss with the dean or placement officer the total background of students who evidence some interest in the foundry. Another means of attracting college graduates on a permanent basis is to offer them summer employment while they are attending college.

College graduates should be given an opportunity to learn the business in its broadest aspects. This can best be accomplished by providing a plan of departmental orientation whereby the college trainee is scheduled to observe and work in such departments as sales, engineering, laboratories, production, shops, accounting, purchasing, etc. At the termination of such a training period, which might range from 6 months to 2 years, depending upon the size and diversity of the operation, the college trainee should be placed permanently in a department that will take advantage of his interest, training, and abilities.

Make Engineering Graduates Prove Worth

His first assignment should definitely be of a nonsupervisory type. If possible, he should be given an opportunity to develop certain basic plant skills which will give him a foundation for future supervisory responsibilities. Once college graduates are permanently placed, they should not be treated differently from any other employee. They should be elevated or given management status only after they have proved themselves on the job.

Foundry management is continually alert to the need for controlling inventories and other assets, protecting its capital investment, developing improved products, and expanding markets. Yet the most valuable asset of any business is its executive and supervisory personnel. The quality of supervision can make or break a company.

According to a recent poll taken by the National Foremen's Institute, the foreman's success depends upon: technical knowledge, 22 per cent; ability to manage and plan, 26 per cent; ability to handle people, 28 per cent; and knowledge of economic facts, 24 per cent. A supervisor's job is to work within established policies and procedures so as to direct employees in use of equipment and materials in accordance with established methods so that his and the company's responsibility for quality, cost and quantity will be met.

Many supervisors have lost their immediate, personal sense of responsibility for the control of cost and quality. Abnormal conditions have prevailed for so long that their competitive instincts have been dulled. Through the war years certain negative attitudes—which reflected ineffective supervisory methods—were allowed to develop, such as misconceptions regarding company, competition and profits; cost-plus thinking; something-for-nothing; individual effort not rewarded; confusion regarding duties, responsibilities and supervisory relationships; company policies not understood nor appreciated; little feeling of personal loyalty; and unsolved production problems. Therefor, it is necessary to establish or re-establish a greater sense of individual responsibility on the part of all members of supervision for the control of quantity, quality and cost of production.

Even though some foundries are handicapped with respect to power supply and modern machinery, surprising increases of productivity are possible through an enlightened management attitude. There is considerable evidence that the ability of most companies to turn out better products at lower costs is limited more by the human element—by the attitude of employees toward their jobs—than by technological considerations. Supervisors should be trained to cultivate good employee attitudes.

Sixteen Point Management Plan

To reduce costs and improve quality, all levels of supervision should be exposed to periodic, long-range management development. The following points may be of assistance in increasing the efficiency of supervisory personnel:

1. Development of an up-to-date organization chart showing the exact relationship between departments.
2. Responsibilities of executives and supervisors should be clearly defined to eliminate duplication and overlapping.
3. Every foreman or supervisor should have a proper title descriptive of his job or status.
4. Members of supervision should be paid a salary commensurate with ability and responsibility, and above the basic earnings of the supervised worker.
5. Selection and placement of employees should be by first-line supervisors; otherwise, unsatisfactory employee-supervisory relations may result.
6. Foremen should be consulted when determining rates of employees under their supervision.
7. Management should place widened emphasis on the selection and development of new foremen and supervisors. A periodic personnel inventory would be of immeasurable value in making objective selections. Permit outstanding employees, including college graduates, to substitute in various supervisory capacities during sickness, vacations, etc.
8. Newly appointed supervisors should be indoctrinated by top executives and other line and staff officers of the company. This program might include

training in such matters as sales, markets, costs, incentives, standards, accident prevention, employment and insurance, interpretation of company policies including the labor contact if one exists, and human relations. It would be desirable to incorporate highlights of these subjects into a "Supervisor's Handbook" that could be presented to each new supervisor at the end of the indoctrination period.

9. All levels of supervision should receive periodic conference training in such basic supervisory principles as inducting new employees; accident prevention; instructing employees how to perform a new duty or skill; scheduling work; anticipating manpower requirements; delegating work assignments; inspection of equipment and repair schedules; preventive maintenance; arranging work methods and schedules with view to good housekeeping and safety; handling daily records and correspondence Also, planning for health and welfare of subordinates; reprimands and discipline; handling requests, complaints and grievances courteously; selling a worker a change in work process or operation; overcoming employee accident proneness; getting workers to take pride in their work; giving an order; handling the chronic griper; developing teamwork; and assisting the supervisor to improve his education and experience.

10. An excellent procedure for making foremen cost conscious is to train them in the elementary principles of methods improvement, emphasizing such items as: scientific management; origination of improvements; making suggestions; how to describe the present job and working conditions by use of layout sketches; breaking down the job by use of process charts; developing the new method; listing details of new method in logical order; writing up proposed new method; getting approval of all concerned; and selling the employee on adopting the new method.

Where foremen have been properly trained to utilize the principles of work methods, departmental costs have been cut at as much as 30 per cent by eliminating waste from ill-directed and ineffective motions.

11. Provide a sound incentive system for both supervisors and workers.

12. Train foremen and supervisors in time and motion study and the setting of equitable rates. This training should enable foremen to see more clearly the relation between wages paid and the final product. A trained supervisor will balance the cost of making improvements against the reduction in cost before advocating change in methods.

13. Weld supervisors closely to top management by setting up an Office of Management Information. The purpose of this office is to make certain that top management is constantly interpreted to the supervisory organization. Immediate steps should be taken to share all new information, decisions, policies, procedures, or plans with supervisors that are applicable to the supervisor's job.

14. Foremen should be encouraged to stimulate employee response regarding suggestions as to cutting costs and boosting production.

15. Provide a medium through which personnel in supervisory positions may work out practical suggestions and submit them for consideration.

16. Management should take such steps as are necessary and desirable to promote and maintain personnel by conducting activities inside and outside the operation. Such activities might include periodic visits to supervisory conferences, requests to address conference groups, outings, dinners, etc.

Training of personnel is one of the most expedient and economical means of improving the competitive position of any company, but it will not happen by chance—foundry management must take deliberate action. A well-trained organization is the best guarantee of an assured future.

Little Woman Wields Big Stick In U. S. Foundry Production: Say British

Pressure on foundryman husbands by wives who want more money to buy automobiles, television sets and better holidays is an outstanding factor in boosting U. S. foundry production, according to a recent statement made by members of a British Gray Iron Foundry Productivity Team newly-returned from an extensive tour of American foundries.

"It is an undoubted fact," a spokesman for the team said, "that American womenfolk exercise considerable influence over their husbands, urging them to make larger earnings so that the standard of living of the family can be improved."

Other factors in the high productivity of U. S. foundries, in the opinion of team members, who visited some 24 foundries in the East and Middle West, are:

Unique American initiative, possibly resulting from descendency from enterprising immigrants and pioneers.

The American's great store of nervous energy.

Better food—fruit, proteins and fats—instead of the "dreary British potato."

The "overhanging threat of unemployment."

Other observations of members of the team, seven of whom were non-supervisory workers, were that the American foundry worker produces 46 gross tons of castings per year, as against only 24 tons by his British counterpart; there is less time wasting than in Britain and a higher degree of cooperation between workers and executives; there is less class distinction in U. S. industry; and most impressive is the American worker's realization that his personal prosperity depends upon the success of his company.

"Although American industry operates to a certain extent under bureaucratic controls, it is not frustrated to the same extent as British industry," said the team spokesman, adding that "American know-how has made the United States foundry industry about twice as good as the British foundry industry."

FOUNDRY INDUSTRY COMMITTEE MEETS WITH MUNITIONS BOARD

LABOR, PROCUREMENT AND MILITARY REQUIREMENTS were cited as three paramount factors in preparing the U. S. foundry industry for national defense mobilization at a meeting of the Foundry Industry Advisory Committee with officials of the United States Munitions Board in the Pentagon, Washington, D. C., on August 22.

Present at the meeting were top U. S. foundrymen, representing gray iron, steel, brass and bronze, malleable iron, aluminum and magnesium foundries, and representatives of the foundry equipment and foundry supplies industries. Purpose of the meeting was to initiate studies leading to recommendations on mobilization planning for the foundry industry. The Munitions Board asked the industry to indicate what steps should be taken to assure maximum foundry production and to avoid the production bottlenecks encountered so frequently in World War II. Each segment of the U. S. castings industry, through its sub-committee representatives, reported on its accomplishments and aims in planning for national defense.

Industry Sub-Committees Report

First of the sub-committees to report was that on Aluminum and Magnesium Castings. Chairman Oliver L. Earl of Acme Aluminum Foundry, Chicago, said that it had been decided to conduct a survey of magnesium facilities in the nation.

Speaking for the Brass and Bronze Castings Sub-Committee, Chairman Edwin W. Horlebein, Gibson & Kirk Co., Baltimore, said that availability of manpower and raw materials would decide whether brass and bronze founders could meet demands placed on them in the event of mobilization. Although brass and bronze foundries are generally small, Mr. Horlebein continued, their production can be expanded to meet increased requirements.

A. J. McDonald of American Steel Foundries, Chicago, speaking for the Cast Armor Plate Sub-Committee, said that foundries have been able to cast little or no armor under postwar specifications and suggested that contracts be awarded three or four foundries for the production of both light and heavy armor so that the experiences of these foundries in mass producing armor would serve as a guide both to the industry and the military.

Cast Iron Pipe Sub-Committee, represented by Donald Armstrong, U. S. Pipe & Foundry Co., Burlington, N. J., stated that since that industry's capacity has greatly increased as a result of new construction, a war-load capacity can be accommodated. Mr. Armstrong suggested that there is need for information on individual plant production data.

A.F.S. National Vice-president Walter L. Seelbach, Superior Foundry, Inc., spokesman for the Gray Iron Castings Sub-Committee, said that the sub-committee has drawn up plans for a proposed survey to obtain information on materials, manpower and capacity for industrial mobilization and that a questionnaire will be distributed to the gray iron foundries of the nation after the Munitions Board approves it.

Malleable Iron Castings Sub-Committee, represented by Collins L. Carter, Albion Malleable Iron Co., Albion, Mich., has prepared a report on the malleable foundry industry's present and anticipated capacities, manufacturers' requirements for skilled and unskilled labor and other data relating to mobilization.

Steel Castings Sub-Committee will make a survey to determine present production capacity, potential capacity, labor and critical material requirements, it was announced by Thomas H. Shartle, Texas Electric Steel Castings Co., Houston, industry representative. For purposes of this survey, capacity estimates are based on the same type of castings as are produced today, and separate breakdowns on cast armor will be obtained to determine potential capacity.

Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., reported on a meeting of the Technical Sub-Committee with members of the Armed Forces earlier this year, in which a preview of mobilization activities of each branch of the foundry industry was outlined. Mr. Kuniansky cited the need for correlation between industrial and Armed Forces specifications and stated that this problem will be considered at a meeting in the near future.

Foundry Equipment Sub-Committee, represented by Thomas Kaveny, Jr., Herman Pneumatic Machine Co., Pittsburgh, and the Foundry Supplies Sub-Committee, represented by F. Ray Fleig, Smith Facing & Supply Co., Cleveland, reported that they had met jointly and had approved a mobilization plan prepared by Lee C. Wilson of the National Security Resources Board.

Sums Up Industry Mobilization Plans

In summing up the foundry industry's over-all plans for foundry mobilization, Frank G. Steinebach, Penton Publishing Co., Cleveland, said that reports of the various industry sub-committees will soon be compiled in a final report to the Munitions Board.

Mr. Steinebach outlined the three principal segments of industry mobilization planning: (1) labor, (2) procurement, and (3) military requirements. He cited manpower shortages as the greatest problem of World War II foundries. These, he said, stemmed from lack of uniform draft regulations, pirating of labor by "glamor" industries, and failure of the military to realize the importance of castings to the war effort until after many plants had to close and scatter their workers to other fields.

Mr. Steinebach further recommended that the foundry industry be recognized as a separate entity and be accorded its rightful importance to the nation in times of national emergency. Individuals appointed by the Government to head the foundry industry effort should be familiar with its problems and potentialities, he added. This should also be true of those persons in the military who are responsible for specifying and procuring castings, he said.

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St. Louis District Chapter

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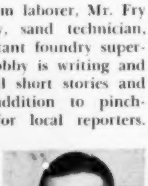
Bucyrus-Erie Co.
South Milwaukee, Wis.
Director
Wisconsin Chapter

WHO'S WHO

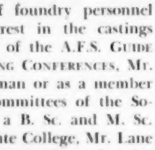
E. W. Fry

Eugene W. Fry, author of *"Sand Control Should Include Mixer Operator Training,"* Page 58, has spent his entire foundry career since graduation from North Texas State College in 1939 with Acme Foundry & Machine Co., Coffeyville, Kan. . . . Starting as a core room laborer, Mr. Fry has been, successively, sand technician, metallurgist and assistant foundry superintendent . . . His hobby is writing and he has written several short stories and feature articles in addition to pinch-hitting occasionally for local reporters.



D. F. Lane

Donald F. Lane, author of *"Expand Foundry Competitive Position Through Better Personnel Training,"* Page 60, although now training director for Lever Bros., Inc., internationally-known soap firm, was for many years active in training of foundry personnel and retains his interest in the castings industry . . . Author of the A.F.S. GUIDE FOR FOREMAN TRAINING CONFERENCES, Mr. Lane served as chairman or as a member of many technical committees of the Society . . . Holder of a B. Sc. and M. Sc. from Pennsylvania State College, Mr. Lane was for several years supervisor of training for the Bethleham Steel Co.'s Sparrows Point, Md., plant, where he developed many new techniques in foundry personnel training.

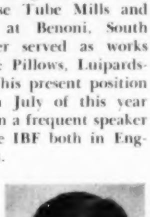


J. M. Kane

John M. Kane, author of *"Fume Control—Electric Melting Furnaces,"* Page 33, has presented papers on industrial dust control before national conventions of A.F.S. and the National Safety Council and local chapters of several engineering organizations, in addition to writing frequently for the technical press on the subject . . . Holder of a B.S. in mechanical engineering from the University of Kentucky in 1933, he has been with the American Air Filter Co., Louisville, since that time and has been chief engineer of the company's Dust Control Division since 1944 . . . He has written on control of dust hazards for Transactions of A.F.S., is active in committee work for several engineering organizations and is advisor to the Kentucky Board of Health.

H. G. Goyns

Hugh G. Goyns, author of *"Steel Casting in South Africa—Feeding Techniques,"* Page 50, is a Scotsman by birth and has served in foundries in his native land, England and South Africa, where he is today consultant to the Foundry & Furnace Dept. of Drury & Co., Johannesburg . . . Mr. Goyns received his first foundry training with Mavor & Coulson in his birthplace, Glasgow . . . In 1939, he joined David Brown & Sons at Penistone, England, and subsequently held executive positions in three English foundries before becoming works manager for the combined firms of Eclipse Tube Mills and Conthwaite & Jane at Benoni, South Africa . . . He later served as works manager for Barrat & Pillows, Luipardsvlei, before assuming his present position with Drury & Co. in July of this year . . . Mr. Goyns has been a frequent speaker before meetings of the IBF both in England and South Africa.



T. E. Eagan

Thomas E. Eagan, author of *"Notch Sensitivity of Various Cast Materials,"* on Page 22, is National Director of the American Foundrymen's Society . . . Born in Sharon, Pa., he took his A.B. at Columbia University in 1923, his B.S. Met in 1925 and Met E. in 1928 from Missouri School of Mines . . . Mr. Eagan's first foundry position was as assistant metallurgist for Simonds Saw & Abrasive Co., Lockport, N. Y., his second in the same capacity with Crucible Steel Co., Harrison, N. J. . . . In 1927 he was appointed assistant superintendent of research for the Midvale Co., Philadelphia, and in 1934 assumed his present position as chief metallurgist for Cooper Bessemer Corp., Grove City, Pa. . . . For many years active in the A.F.S. Gray Iron Division, of which he is a past chairman, Mr. Eagan is also well-known for his work with AIME, ASM, ASTM and SAE and is a member of British Iron & Steel Institute.

C. O. Burgess

Charles O. Burgess, author of *"Gray Iron—Welding, Joining and Cutting,"* Part II of which appears on Page 44 of this issue, is technical director of the Gray Iron Founders' Society and a frequent and well-known speaker before A.F.S., ASM, ASTM and other technical metals societies on production of high-duty cast irons and effects of alloys, inoculants, etc. . . . He has written many articles for the technical press and contributed monographs to the A.F.S. CAST METALS HANDBOOK while serving as chairman of the Handbook Committee . . . Past chairman of the A.F.S. Gray Iron Division, he has served on many technical committees of A.F.S. and is past chairman of the Western New York Chapter of the Society . . . Formerly head of Union Carbide & Carbon Corp. Research Laboratories' Cast Iron and Steel departments, he has been technical director of the Gray Iron Founders' Society since 1948.

Reading, Lancaster Groups Hold Cabinet Meet

NEW LEGISLATION and its effect on the castings industry were explained to a joint meeting of the Reading Foundrymen's Association and the Conestoga Foundrymen's Association of Lancaster, Pa., held in Reading October 18.

Speaker F. G. Steinebach, Penton Publishing Co., Cleveland, described effects of the newly-organized National Production Authority on the future of the industry and told of the important role America's 5,947 foundries play in the nation's economy. Hermann P. Good, president of the Gray Iron Founders' Society, reported on his recent trip to Europe, where he attended the Annual Meeting of the Institute of British Foundrymen, and visited foundries in England and Europe.

Presiding was Al Wentzel, president of the Reading group, with Thomas Blank, chairman, and David M. Keener, treasurer, of the Conestoga group, and L. C. Wilson, Past President of A.F.S. and the National Foundry Association, attending.

New AFS MEMBERS

NEW SUSTAINING MEMBERS

Kuhns Bros. Co., Dayton, Ohio—Robert W. Kuhns, Pres. (Cincinnati Chapter)—Conversion from Company.

NEW COMPANY MEMBERS

Food Machinery Corp., Hoopeston, Ill.—W. A. Bjorklund (Chicago Chapter)—Conversion from Personal.

St. Louis Steel Castings Co., St. Louis—C. A. Binder, Pres. (St. Louis District Chapter)—Conversion from Personal.

Utica General Jobbing Fdy., Utica, N. Y.—Joseph S. Buccolo, Fdy. Mgr., (Central New York Chapter)—Conversion from Personal.

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Donald E. Matthieu, Chief Met., Alabama Pipe Co., Anniston, Ala.

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Orrin C. Castle, Sub. Fmn., Caterpillar Tractor Co., Peoria, Ill.
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Leonard L. Curry, Fmn., Caterpillar Tractor Co., Peoria, Ill.
Fred S. Frost, Supt., American Foundry & Furnace Co., Bloomington, Ill.
Forrest Hargadine, Sub. Fmn., Caterpillar Tractor Co., Peoria, Ill.
Raymond H. Hays, Physical Met., Caterpillar Tractor Co., Peoria, Ill.
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Hyrum Henry Copeland, Donovan, Inc., St. Paul.
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Herman Madland, Asst. Fdy. Supt., American Hoist & Derrick Co., St. Paul.
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MISSOURI SCHOOL OF MINES

Frank Murray Almeter
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Melvin A. Buettner
Milton Roger Burns
Irving J. Hutkin
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Japan

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Shoichi Obama, Engr. Fdy. Plant, East Japan Heavy-Industries Ltd., Ota-Ku, Tokyo, Japan.

Norway

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Letters to the Editor

All letters of broad interest which do not violate A.F.S. policy or good taste are publishable. Write to Editor, American Foundryman, 616 S. Michigan Ave., Chicago 5, Ill. Letters must be signed but will be published anonymously on request.

How To Make And Operate A Miniature Cupola

Answering your request for more information on the small experimental cupola shown on page 45 in the Modern Foundry Methods story of the August issue of AMERICAN FOUNDRYMAN, I'm giving you the following data:

PERTINENT DIMENSIONS—shell diameter, 7 in. ID; lining diameter 4½ in. ID; overall height 30 in.; six equally spaced tuyeres, ½ in. D; slaghole, ⅝ in. D, 1½ in. below tuyeres; and taphole, ¾ in. D, adjustable from 2½ to 5 in. below tuyeres.

CONSTRUCTION—The shell of the cupola was made from a length of 7 in. ID steel pipe. A 12 in. OD 4½ in. ID plate was welded to the bottom of the pipe to form a baseplate. The windbox is of 14 ga. welded steel construction and contains six peepholes opposite the tuyeres. Openings for a one inch air line and a ¼ in. manometer connection are also provided.

The lining is of one piece construction and is formed by ramming the refractory mixture around a 4½ in. OD pipe, the pipe form being moved as the lining increases in height. The tuyeres are formed by inserting ½ in. steel rods through the peepholes and through the shell as the lining is rammed into place. A lining mixture which has proved satisfactory is: ground firebrick, 40 per cent; 12 mesh fireclay, 40; ground graphite, 20; all by weight. Moisture added is six to eight per cent.

CUPOLA OPERATION—A sand bottom is rammed in place and coke is added to the height of the tuyeres. This coke is ignited through the taphole by means of a blast lamp. When the initial coke is burning well, the coke bed is gradually built up to a height of six or seven inches above the tuyeres.

A small flow of air through the bed is maintained for about an hour before charging is begun in order to preheat the lining. This must be done to avoid cold iron and frozen tapholes.

After the cupola has been preheated in this fashion, the bed height is adjusted once more and charging is started. A typical charge is: 2½ lb iron; 5 oz coke, ¾ in. to ¼ in. mesh; and 1 oz limestone, ¼ in. and under.

Molten iron appears at the tuyeres approximately eight minutes after the blast is turned on. The cupola is tapped intermittently, yielding approximately six pounds of metal per tap.

SAND BOTTOM—The sand bottom is rammed over a refractory block and the cupola sits upon the sand during operation. When we want to drop bottom, we simply raise the cupola by lifting it with a ¾ in. pipe welded to the shell.

R. J. ZEMANEK, *Gen. Sls. Mgr.*
United States Graphite Co.
Saginaw, Mich.

Completes The Story

Here's an additional thought to add to my commentary "How to Salvage Brass Grindings" which appeared in The Round Table, page 61, October issue of AMERICAN FONDRYMAN:

The economy of the process will depend partly on the composition of the brass being ground. The foundryman's red brass should be easily handled, while compositions high in zinc, such as the yellow brasses, may not readily produce fluid slags, and may also show high zinc losses. In any case, after preliminary tests, the costs and values of the operation should be critically examined.

A. K. HIGGINS, *Supt.*
Chem. and Met.
Allis-Chalmers Mfg. Co.
Milwaukee

Irish Foundries Doing Better

H. J. Bullock of the British Moulding Machine Co. visited me recently and told of his very successful visit to the American Foundrymen's Society Convention in Cleveland, at the same time mentioning how kind and hospitable the members of the Society were to him on that occasion.

At the General Meeting of the Irish Ironfounders' Association held recently, P. E. W. Burgess, Western Iron Co. Ltd., was elected chairman on my retirement. Other members of the committee are: vice-chairmen—E. Davis, T. Jessop Davis, Enniscorthy, and myself; secretary-treasurer, A. J. R. Cullinan, G. J. Rowe, Hammond Lane Ironfounders Ltd., Dublin; R. Merrick, R. Merrick & Sons Ltd., Cork; A. Brown, Brown's Foundry Letterkenny; H. J. Hosie, Industrial Vehicles Ltd., Athy; C. Tonge, Tonge & Taggart, Ltd., Dublin; J. Corrie, Irish Foundries Ltd., Bailieborough; G. Taylor, Drogheda Ironworks, Ltd., Drogheda; P. Lawless, Wexford Engineering Co., Wexford; T. Williams, Macroom Engineering Co., Macroom; and G. McBride, Wm. McBride & Sons, Ltd., Cork.

All the foundries in Ireland are working at peak capacity and many of them, like ourselves, are increasing plant and equipment in order to overtake the accumulation of orders. Supplies of raw materials, such as pig iron, coke, and scrap iron, are quite satisfactory and the Irish foundrymen have no worries in this regard.

A new foundry has recently opened up at Bailieborough, County Cavan, for the production of vitreous enamelled cast iron baths. Trading under the name of Irish Foundries Ltd., this is the first foundry in the Republic of Ireland to manufacture these cast iron baths. Consequently their enterprise is welcomed in the State.

S. W. AITKEN, *Director*
Hammond Lane Ironfounders Ltd.
Dublin, Ireland

FOUNDRY *Personalities*

William C. Hookway, Jr., has been named assistant to the chief engineer of Cooper Alloy Foundry Co., Hillside, N. J. Prior to joining Cooper Alloy recently as northern New Jersey sales representative, Mr. Hookway was with the H. A. Wilson Co. and Gibb & Cox, Inc. He holds a B.S. in Industrial Engineering from Lehigh University. Mr. Hookway will be succeeded as northern New Jersey sales representative by **James Ziegler,** company sales representative in the Pittsburgh-Cleveland area.

W. C. Hookway, Jr.

E. A. Hund

C. T. Jorgensen

Leonard O. Hofstetter, past president and one of the founders of the A.F.S. Southern California Chapter, has been elected president of the Brumley-Donaldson Co., Los Angeles, succeeding **E. L. Brumley,** who has been named chairman of the company's Board of Directors. Mr. Hofstetter started with the company in 1938 as a salesman and for the past two years has been manager of the company's Los Angeles office.

Ralph C. White, formerly foundry foreman at American Brake Shoe Co.'s Brake Shoe & Castings Division's North Kansas City, Mo., plant, has been named foundry superintendent. Mr. White started with Brake Shoe in 1937 as a molder. Other Brake Shoe & Castings Division appointments announced are those of **Thomas J. Wood,** formerly district works manager, to be chief Division metallurgist; and **Raymond A. Martinson,** formerly foundry foreman at the Division's Chicago "Q" plant, to be plant superintendent.

Ernest A. Hund has been named vice-president of the newly-organized Push Button Foundry Equipment Division of the W. G. Reichert Engineering Co., Newark, N. J. Mr. Hund has been in the foundry and foundry equipment industries for more than 25 years and has been a member of the American Foundrymen's Society throughout that time. Prior to his present appointment, he was associated in supervisory engineering capacties with Allis-Chalmers Mfg. Co., Link-Belt Co., National Engineering Co., Barber-Greene Co., Lester B. Knight & Associates, Inc., and the Productive Equipment Co. As vice-president of the Push Button Foundry Division, Mr. Hund will supervise production of a revolutionary new line of controls for molding, shakeout and pouring operations.

Joseph L. Kopf, president of Jabez Burns & Sons, Inc., was elected president of the National Metal Trades Association at that organization's Annual Meeting on September 25. Other officers elected are: first vice-president, **Philip M. Morgan,** president of the Morgan Construction Co., Worcester, Mass.; and second vice-president and treasurer, **Charles S. Craigmile,** president of the Belden Mfg. Co., Chicago. Elected to the Association's Administrative Council are: **Ernest F. Stockwell,** Barbour-Stockwell Co., Cambridge, Mass., **John E. Echlin,** Echlin Mfg. Co., New Haven, Conn.; **Norman L. Rowe,** Ideal Roller & Mfg. Co., Inc., Long Island City, N. Y.; **W. R. Daniels,** M. P. Moller, Inc., Hagerstown, Md.; **J. E. O'Brien,** Banner Die, Tool & Stamping Co., Columbus, Ohio; **Donald D. Burdett,** The Cleveland Twist Drill Co., Cleveland. **Robert T. Skilliter,** Acme Specialty Mfg. Co., Toledo, Ohio; **L. M. Dexter,** National Brass Co., and **R. G. Wilson,** Challenge Machinery Co., both of Grand Rapids, Mich.; **Walter F. Newhouse,** Saranac Machine Co., Benton Harbor, Mich.; **T. J. Morton, Jr.,** Hoosier Cardinal Corp., Evansville, Ind.; **L. H. Schrade,** D. O. James Gear Mfg. Co., Chicago; **A. F. Shafter,** U. S. Mfg. Corp., Decatur, Ill.; **H. M. Ramel,** Ramsey Corp., St. Louis, Mo. and **Lawson Adams,** Wrought Washer Mfg. Co. of Milwaukee.

Charles T. Jorgensen, for the last seven years Milwaukee sales manager for the Palmer-Bee Co., Detroit, has been named president of the newly-formed U. S. Engineering Corp., Milwaukee conveyor and materials handling systems manufacturers and engineers. Other officers of the new company are: vice-president, **J. H. Fletcher,** and vice-president and treasurer, **L. F. Miller,** both formerly with Palmer-Bee; and secretary and legal counsel, **R. H. Oberndorfer,** corporation lawyer.

J. P. McClendon, Charles G. Sellers, L. H. Swan and **E. M. Cranford** of Stockham Valves & Fittings, Birmingham, attended the National Safety Congress and Exposition in Chicago in October and visited Chicagoland foundries to study foundry safety programs.

A.F.S. National President **Walton L. Woody,** National Malleable & Steel Castings Co., Cleveland, has presented a set of the Society's publications to his alma mater, Rose Polytechnic Institute. He is chairman of RPI's Library Committee.

Donald R. Smith, who has been with the Ironton Fire Brick Co., Ironton, Ohio, since 1941, has been named manager of the company's Special Products Division. Since joining Ironton, Mr. Smith has had leaves of absence to join the Navy in World War II and as a ceramic engineering student at Ohio State University, where he specialized in the application of mineralogy to the development of refractories for the foundry and steel industries.

Dr. J. C. Warner, who became fourth president of the Carnegie Institute of Technology in July, was officially inaugurated October 27 in the first ceremony of its kind in the school's 50-year history. **Dr. Robert E. Doherty** who retired from the presidency this year, attended the ceremony, which coincided with Carnegie Tech's Golden Anniversary celebration.

F. P. Biggs

New executive appointments announced by the American Brake Shoe Co. are: **Fred P. Biggs**, first vice-president of Brake Shoe Division, to be Division president; **Stephen S. Conway**, vice-president of Brake Shoe Division, to be vice-president

S. S. Conway

in charge of sales of the Brake Shoe & Castings and Southern Wheel Divisions; **Ralph L. Robinson**, assistant vice-president of the Brake Shoe & Castings and Southern Wheel Divisions, to be vice-president of both Divisions; and **Edward R. Anderson**, formerly vice-president of the company's Kellogg Division, to be vice-president of the Brake Shoe & Castings Division. Mr. Biggs has been with Brake Shoe since 1916, Mr. Conway since 1912, Mr. Robinson since 1928 and Mr. Anderson since 1930.

Paul L. Eness has been named a member of the Product Development Laboratory staff of the Acheson Colloids Corp., Port Huron, Mich., succeeding **D. G. Weaver**, who has been transferred to the company's Newark, N. J., office. A gradu-

(Continued on Page 95)

A. F. S. CHAPTER DIRECTORY

BIRMINGHAM DISTRICT CHAPTER *Secretary-Treasurer*, F. K. Brown, Adams, Rowe & Norman, Inc., 722 Brown-Marx Bldg., Birmingham, Ala.

BRITISH COLUMBIA CHAPTER *Secretary-Treasurer*, W. R. Holeton, British Columbia Research Council, University of B.C., Vancouver, B.C., Canada.

CANTON DISTRICT CHAPTER *Secretary*, Dale Crumley, 377 Broad St., Wadsworth, Ohio.

CENTRAL ILLINOIS CHAPTER *Secretary-Treasurer*, Burton L. Bevis, Caterpillar Tractor Co., 600 W. Washington St., Peoria, Ill.

CENTRAL INDIANA CHAPTER *Secretary*, Fred Kurtz, 39 E. Ninth St., Indianapolis. 39 E. Ninth St., Indianapolis.

CENTRAL MICHIGAN CHAPTER *Secretary-Treasurer*, Thomas T. Lloyd, Albion Malleable Iron Co., Albion, Mich.

CENTRAL NEW YORK CHAPTER *Secretary*, D. J. Merwin, Oriskany Malleable Iron Co., 1431 Genessee St., Utica.

CENTRAL OHIO CHAPTER *Secretary*, C. T. Greenidge, Battelle Memorial Institute, Columbus.

CHESAPEAKE CHAPTER *Secretary-Treasurer*, Clausen A. Robeck, Gibson & Kirk Co., Warner & Bayard Sts., Baltimore 30, Md.

CHICAGO CHAPTER *Secretary*, G. J. Biddle, Illinois Clay Products Co., 208 S. LaSalle, Chicago.

CINCINNATI DISTRICT CHAPTER *Secretary*, Burt A. Genthe, S. Obermayer Co., 647 Evans St., Cincinnati, 4.

DETROIT CHAPTER *Secretary*, Michael Warchol, Atlas Foundry Co., 131 S. Livernois St., Detroit 17.

EASTERN CANADA CHAPTER *Secretary*, Alfred H. Lewis, Dominion Engineering Works, Ltd., P.O. Box 220, Montreal, Que.

EASTERN NEW YORK CHAPTER *Secretary-Treasurer*, Leigh M. Townley, Adirondack Foundries & Steel Co., Watervliet, N. Y.

METROPOLITAN CHAPTER *Secretary*, J. F. Bauer, Hickman, Williams & Co., 70 Pine St., New York.

MEXICO CITY CHAPTER *Secretary*, N. S. Covacevich, Apartado 1030, Mexico, D. F., Mexico.

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NORTHERN ILLINOIS-SOUTHERN WISCONSIN *Secretary*, Jack Rundquist, Beloit Casting Co., Beloit, Wis.

NORTHWESTERN PENNSYLVANIA CHAPTER *Secretary*, Earl Strick, Erie Malleable Iron Co., Erie, Pa.

ONTARIO CHAPTER *Secretary-Treasurer*, G. L. White, Westman Publications, Ltd., 137 Wellington St. W., Toronto, Ont., Canada.

OREGON CHAPTER *Secretary-Treasurer*, William M. Halverson, Electric Steel Foundry Co., 2141 N.W. 25th, Portland, Ore.

PHILADELPHIA CHAPTER *Secretary-Treasurer*, W. B. Coleman, W. B. Coleman & Co., 9th and Rising Sun Ave., Philadelphia.

QUAD CITY CHAPTER *Secretary-Treasurer*, R. E. Miller, 4115 7th Ave., Moline, Ill.

ROCHESTER CHAPTER *Secretary-Treasurer*, Duncan Wilson, American Brake Shoe Co., 10 Mt. Read Blvd., Rochester 11.

SAGINAW VALLEY CHAPTER *Secretary-Treasurer*, Walter F. Bohm, 329 W. Hamilton, Flint 4, Mich.

ST. LOUIS DISTRICT CHAPTER *Secretary*, Paul E. Retzlaff, Busch-Sulzer Bros. Diesel Engine Co., Div. Nordberg Mfg. Co., 3300 S. Second St., St. Louis 18.

SOUTHERN CALIFORNIA CHAPTER *Secretary*, Harold G. Pagenkopp, Angelus Pattern Works, 2084 Belgrave Ave., Huntington Pk., Calfiornia.

TENNESSEE CHAPTER *Secretary-Treasurer*, Herman Bohr, Jr., Robbins & Bohr, Chattanooga Bank, Chattanooga, Tenn.

TEXAS CHAPTER *Secretary*, John M. Morris, Lone Star Steel Co., P. O. Box 8087, Dallas 5, Texas.

TIMBERLINE CHAPTER *Secretary*, James Schmuck, Rotary Steel Castings Co., 1425—5th St., Denver, Colorado.

TOLEDO CHAPTER *Secretary-Treasurer*, R. C. Van Hellen, Unitcast Corp., 1414 E. Broadway, Toledo, Ohio.

TRI-STATE CHAPTER *Secretary*, C. C. Beagle, Webb Corp., Box 549, Webb City, Mo.

TWIN-CITY CHAPTER *Secretary-Treasurer*, Lillian K. Polzin, Minneapolis Chamber of Commerce, 1750 Hennepin at Groveland Terrace, Minneapolis.

WASHINGTON CHAPTER *Secretary*, F. R. Young, E. A. Wilcox Co., 517 Arctic Bldg., Seattle 4, Wash.

WESTERN MICHIGAN CHAPTER *Secretary*, Lauren Ramsey, Paul M. Weiner Foundry Co., Box 216, Muskegon, Mich.

WESTERN NEW YORK CHAPTER *Secretary*, R. E. Walsh, Hickman, Williams & Co., 32 Eastwood Place, Buffalo, N. Y.

WISCONSIN CHAPTER *Secretary*, J. G. Risney, Risney Foundry Equip. Co., 1907 N. 63rd St., Milwaukee 13.

STUDENT CHAPTERS

MIT *Secretary-Treasurer*, Charles R. Herbert

UNIVERSITY OF ILLINOIS *Secretary*, Eugene Keith Van Ness

MICHIGAN STATE COLLEGE *Secretary-Treasurer*, William Dieters

UNIVERSITY OF MINNESOTA *Secretary-Treasurer*, Gerald A. Sporre

MISSOURI SCHOOL OF MINES *Secretary*, Ralph E. Johnston

OHIO STATE UNIVERSITY *Secretary-Treasury*, Edward H. Losely

OREGON STATE COLLEGE *Secretary*, Leonard M. Preston

TEXAS A & M COLLEGE *Secretary*, R. L. Jones

UNIVERSITY OF ALABAMA

Here are some of the 400 foundrymen who attended Tennessee Chapter's Annual Barbecue, held Aug. 26 at Signal Mountain Golf & Country Club. Sports and an old-fashioned Southern barbecue highlighted the event.

CHAPTER ACTIVITIES NEWS

Chicago

Dean Van Order
Burnside Steel Foundry Co.
Chapter Reporter

APPROXIMATELY 200 MEMBERS and guests attended the first meeting of the season October 2 at the Chicago Bar Association. Chapter Chairman, C. V. Nass, Pettibone Mulliken Corp., and Vice-Chairman Walter Moore, Burnside Steel Foundry Co., introduced speakers on *"Air Pollution Problems Faced by Chicago Foundrymen,"* a topic of interest to everyone attending.

Guenther Baumgart, secretary of the Chicago Cleaner Air Committee, read a paper prepared by Vernon G. Leach, chairman of the Committee, in which he stated that Chicago and Chicago foundrymen are assuming national leadership in protecting the atmosphere against pollution.

Frank A. Chambers, inspector for the Chicago Department of Smoke Abatement, told the group that smoke control dates back to 1880 and described methods for testing air pollution and some of the surveys made in large industrial cities, such as Los Angeles and Cleveland.

Final speaker for the evening, James R. Allan, International Harvester Co., asked that foundry management look over its individual shops for all sources of air pollution to see what methods could be used to correct these conditions. He mentioned some of the new inventions and improvements on the market for controlling air pollution. The meeting was closed with the reports of several committees on smoke abatement.

Talking over foundry problems following the October 2 meeting of Western Michigan Chapter were, left to right: Vincent Jeannot, West Michigan Steel Foundry, Muskegon; Speaker William T. Bean, Jr., Industrial Electronics, Inc., Detroit; Charles N. Jacobson, Dake Engine Co., Grand Haven; and John Geboo, Campbell, Wyant & Cannon Foundry Co., Muskegon.

Quad City

Elmer C. Zirzow
Deere & Co.
Chapter Reporter

CASTING DEFECTS were the topic of Speaker William A. Hambley, Wilson Foundry & Machine Co., Pontiac, Mich. at the October 16 meeting.

Mr. Hambley pointed out that defective castings could be classified into three general categories: (1) Defective castings that are 100 per cent scrap or a total loss; (2) Defective castings that require a major salvage operation to make them usable and (3) Defective castings that require a minor salvage operation to make them usable.

Although the latter two groups are not a total loss, the speaker said, it requires additional cost to make them usable. Hence the cost of repairing castings should be taken into consideration and be included in the cost of defective castings. In those castings which require a major salvage operation it sometimes becomes necessary to decide

whether it is cheaper to repair a casting or make a new one. Returns from the customer and machine shop scrap should be included in the foundry scrap, he added.

In the analysis of casting defects, honesty is a prime requisite, Mr. Hambley said. The man making analysis of the defect must be honest with himself, the speaker pointed out, adding that he has seen many sand holes cured by removing shrink. This is obviously a case of mistaken or dishonest analysis of the defect, he said.

Honesty in assessing the responsibility for the defect is essential, according to the speaker and a good foreman will follow his casting to find immediate scrap by watching sand, metal, pouring etc.

Honesty about materials is also necessary, according to Mr. Hambley, because as a rule materials do not cause scrap if used according to instructions.

In conclusion, Mr. Hambley pointed out that casting defects can be eliminated by: (1) Proper training of personnel—foremen and workmen must be made aware of causes of defects and must be made scrap conscious; (2) Elimination of alibis or passing the buck; (3) Use of charts and (4) Use of published material and the reports of various AFS committees.

The speaker concluded by showing slides illustrating various defects and suggesting ways of eliminating them.

Speakers' table at the September 18 meeting of the Oregon Chapter included, left to right: Director Harold A. Story, Oregon Brass Works; Program Chairman James T. Dorigan, Electric Steel Foundry Co.; A.F.S. National Director Thomas E. Eagan, Cooper Bessemer Corp., Grove City, Pa., speaker of the evening; Chairman James T. Brodigan, Columbia Steel Castings Co.; Director George C. Vann, Northwest Foundry & Furnace Co., and Secretary-Treasurer William M. Halverson, Electric Steel Foundry Co.

Prominent California foundrymen and A.F.S. Northern California Chapter officials were on hand to honor A.F.S. National President Walton L. Woody (third from left, foreground) at a dinner meeting in Oakland during his recent West Coast Tour. (Photo: Sam Russell, Phoenix Iron Works.)

Missouri School of Mines

Norbert F. Neumann
Reporter and Photographer

First meeting of the Student Chapter season was held September 28. Seven visitors from the St. Louis District Chapter and 64 students were in attendance. Guests from St. Louis were: Albert L. Hunt, Herman Weber, Wil-

Chicago Chapter's first meeting of the season, October 2, featured discussion of a topic timely and important to every foundryman—air pollution. Photo at left shows James R. Allan, International Harvester Co., discussing how foundries can combat air pollution. Behind him is Guenther Baumgart of the Chicago Association of Commerce and Industry, who also spoke on the program. In photo at right, Frank A. Chambers of the Chicago Department of Smoke Abatement and Inspection, tells foundrymen what the public expects of them in the way of air pollution control. Seated behind him are Chapter Chairman C. V. Nass, Pettibone Mulliken Corp., and Vice-Chairman W. W. Moore, Burnside Steel Foundry.

liam Baxter, all of American Brake Shoe Co.; John Mitchell, Marshal Petty and Samuel Gilly of the Key Co.; Norman Peuckert, Carondelet Foundry Co.

Daniel Eppelsheimer, professor of metallurgical engineering, welcomed new students to the meeting. Student Chapter President George Sullivan introduced Albert L. Hunt, who presented the school with a complete library of A.F.S. publications, a gift from the St. Louis Chapter. After the presentation, Mr. Hunt spoke on *"What the Foundry Industry Has to Offer MSM Students."*

Main topic of Mr. Hunt's talk was the training programs used by some companies in this area. Operating, sales and engineering are the three divisions into which a trainee may graduate, Mr. Hunt said. For a year the trainee works in every department in the plant. After this initiation period, he is placed into the department for which he is best suited, to work for another year. At the end of the two-year program he is given a permanent position with the company, he concluded.

A few aluminum castings were poured in the school foundry. Refreshments were served and the meeting was adjourned.

On October 7 the school foundry was placed on exhibit as part of a Parents' Day program. Approximately 450 people visited the foundry and saw a complete casting operation—from sand preparation to shakeout. Gray iron was tapped from the cupola and aluminum from a crucible furnace. The foundry was operated by scholarship students.

Having a good time at Northern California Chapter's Annual Golf Party, September 29, were, left, Harold Martin, Atlas Foundry & Mfg. Co., Richmond, Calif., and Paul Jordan, Vulcan Iron Foundry.

Amused at one of A.F.S. President Walton L. Woody's off-the-record quips during Northern California Chapter's National Officer's Night was Past Chapter President Edward M. Welch, American Manganese Steel Div., American Brake Shoe Co.

Eastern New York

George E. Danner
American Locomotive Co.
Publicity Chairman

SEPTEMBER 19 meeting featured an inspection trip through General Electric Co.'s Schenectady steel and iron foundries, pattern shop and new turbine building.

E. S. Lawrence of the General Electric iron foundry engineering staff, and A. J. Kiessler of the General Electric steel foundry engineering staff, lead the groups and explained the various operations viewed. Among the most interesting were the pouring of a 35-ton cast iron turbine shell and special coring operations. Also of interest was the new 17-ton-per-hour electric melting furnace in the steel foundry.

The technical session was held later in the evening with Messrs. Lawrence and Kiessler explaining and discussing their respective foundries' operation.

Western Michigan

C. H. Cousineau
Carpenter Bros., Inc.
Publicity Chairman

FIRST MEETING of the season was held at the Cottage Inn, Muskegon, October 2, and featured as speaker of the evening William T. Bean, Jr., Electronic Castings, Inc., Detroit. Mr. Bean spoke on *"Sound Castings CAN Be Engineered,"* in which he described industrial applications of brittle lacquer and strain gages in experimental stress analysis.

Mr. Bean cited practical examples of results obtainable through this type of research and pointed out the tremendous possibilities and advantages of better casting design to the foundry industry.

It was announced at the meeting that Harold BeMent, chief metallurgist, Campbell, Wyant & Cannon Foundry Co., Muskegon, is now recuperating at his home in Muskegon following a serious illness.

Rochester

Donald E. Webster
American Laundry Machine Co.
Chapter Reporter

OPENING MEETING of the fall season was held at the Hotel Seneca, Rochester, on October 3 and was devoted to *"Costs."* Speaker of the evening was Milton E. Annich, American Brake Shoe Co., Mahwah, N.J.

Mr. Annich pointed out that keener

More than 850 Michigan foundrymen attended Western Michigan Chapter's Annual Stag Picnic at Pontaluna Golf Course, near Muskegon, Aug. 19. Picnic highlights included golf, horseshoes, baseball, barbecue.

competition and development of new methods, makes it of paramount importance that a foundry know all details of its operating costs if it is to be successful.

Actual melting, molding, and core making costs are readily arrived at, the speaker said, but such items as fixed charges, payroll costs, sales and administration costs must be given equal consideration. When all of these items are known it is possible to arrive at the "break-even tonnage"—the point where total cost and selling price are equal, Mr. Annich concluded.

Chapter Chairman Kenneth R. Proud, Anstice Corp., presided at the dinner meeting, and introduced guests from American Brake Shoe Co., a number of out-of-town guests and new chapter members. Reports of the secretary-treasurer, membership chairman, and the chairman of the recent annual outing concluded the meeting.

Central Illinois

Robert J. Paluska
Caterpillar Tractor Co.
Chapter Reporter

First meeting of the 1950-1951 season was held at the American Legion Hall, Peoria. Almost 100 members heard an interesting talk on *"What Makes Business Tick,"* presented by W. Franklin, Caterpillar Tractor Co., Peoria, Illinois.

Mr. Franklin pointed out that profits from many businesses are in direct relation to sales and to the quality and service of product. Therefor, he said, foundries should strive to produce saleable quality castings. As a token of appreciation, the Chapter presented Mr. Franklin with a desk plaque.

Chapter Chairman C. W. Russell, announced that chapter officers and directors had unanimously voted to contribute $1000 towards the building of a permanent home for A.F.S.

Congratulations were in order for the membership committee for the 30 new members recently acquired.

The Peoria Association of Commerce requested the Chapter to prepare a mobile display showing the evolution of a casting from the blue print to the finished casting, to be used by the Peoria schools.

Western New York

Marve Taublieb
Frederic B. Stevens, Inc.
Publicity Chairman

OCTOBER MEETING, first of the new season, was held at the Hotel Sheraton, Buffalo, October 6, with Emil H. Lang, Erie Forge Co., Erie, Pa. speaking on *"Service."*

Mr. Lang pointed out that service is the act or occupation of working for another, and this applies to a company to a customer, a townsman to his

Feature of Eastern New York Chapter's all-day meeting, September 19, was a tour of General Electric Company foundries at Schenectady, N. Y.

MSM Student Chapter Member George Wagner adjusts crucible furnace burner during Missouri School of Mines Parents' Day foundry open house.

Enjoying themselves at Western Michigan Chapter's Annual Picnic, held August 19 at Pontaluna Golf Course, near Muskegon, were, left to right: Chapter Chairman Stanley H. Davis, Campbell, Wyant & Cannon Foundry Co., Muskegon; Guest Jack Secor, Hill & Griffith Co., Niles, chairman of the A.F.S. Central Michigan Chapter; and Howard H. Wilder, Vanadium Corp. of America, Detroit. At the time this photo was taken, Mr. Wilder was Saginaw Valley Chapter chairman and chief metallurgist for Eaton Mfg. Co.'s Foundry Division at Vassar, Mich. He is now with Detroit Chapter.

town, and a citizen to his country.

"Practically everyone is working for someone else, so we all serve one another. It is giving the best product to our customer at competitive prices. This statement is idealistic, but fundamentally important," Mr. Lang said. He continued by saying, "It is now our duty to render a service to our country to produce the best material possible."

Albert A. Diebold, Atlas Steel Castings Co., Chairman of the chapter, introduced Austin C. Ross, Worthington Pump and Machinery Corp., as technical chairman, who in turn introduced Mr. Lang.

A.F.S. National Director Thomas E. Eagan, Cooper Bessemer Corp., Grove City, Pa., speaking on "Nodular Iron and Its Practical Aspects" at Oregon Chapter's September 18 meeting. (Photo: Blake Jackson, Electric Steel Fdy. Co.)

FUTURE CHAPTER MEETINGS

• NOVEMBER 16

CHESAPEAKE
Engineers Club, Baltimore
H. F. Bishop
Naval Research Laboratory
"Heat Transfer in Sand Molds"

ST. LOUIS DISTRICT
Harry W. Dietert
Harry W. Dietert Co.
"Sand Control and Its Relationship to Casting Quality"

DETROIT
Leland Hotel, Detroit
Film: *"Fluid Flow in Transparent Molds—No. II"*
Past Chairmen's Night

• NOVEMBER 17

BIRMINGHAM DISTRICT
Tutwiler Hotel, Birmingham
Frank W. Less
Durez Plastics & Chemicals, Inc.
"The 'C' Process for Molds and Cores"

ONTARIO
Royal Connaught Hotel, Hamilton
Group Meetings

EASTERN CANADA
New Sherbrooke Hotel, Sherbrooke, Que.
Problem Casting Forum

TRI-STATE
Tulsa, Okla.
Howard H. Wilder
Vanadium Corp. of America
"Cupola and Permanent Molding Practice"

NORTHERN CALIFORNIA
Shattuck Hotel, Berkeley
Thomas E. Barlow
Eastern Clay Products, Inc.
"Cupola Practice"

• NOVEMBER 20

QUAD CITY
Ft. Armstrong Hotel, Rock Island, Ill.
Robert P. Schauss
Illinois Clay Products Co.
"Gating and Feeding of Castings"

OREGON
Heathman Hotel, Portland
Thomas E. Barlow
Eastern Clay Products, Inc.
"Sand Control"

• NOVEMBER 21

EASTERN NEW YORK
Circle Inn, Lathams
Harry St. John
Crane Co.
"Brass and Bronze Foundry Practice"

• NOVEMBER 24

WASHINGTON
Gowman Hotel, Seattle
Thomas E. Barlow
Eastern Clay Products, Inc.
"Cupola Practice"

• NOVEMBER 27

NORTHWESTERN PENNSYLVANIA
Moose Club, Erie
R. A. Colton
American Smelting & Refining Co.
"Some Problem Bronze Castings"

• NOVEMBER 29

CENTRAL MICHIGAN
Olds Hotel, Lansing
C. O. Bartlett
C. O. Bartlett & Snow Co.
Austen J. Smith
Michigan State College
"Non-Ferrous Casting Practice"

• DECEMBER 1

TENNESSEE
Hotel Patten, Chattanooga
James H. Smith
General Motors Corp.
"Future of the Foundry Industry"

Central New York

James W. Ogden
Cleveland Tramrail Syracuse Co.
Publicity Chairman

Sixty-five members and guests heard W. A. Hambley, Wilson Foundry & Machine Co., Pontiac, Mich., speak on *"Casting Defects"* at the first meeting of the season, held September 8 at Twin Ponds Country Club.

Mr. Hambley opened his talk with a general discussion of the foundry industry and its position in the engineering world today. He complimented the industry on the manner in which foundries are exchanging information and ideas for the advancement of the castings art.

Mr. Hambley presented a series of slides showing typical casting defects and suggested remedies for overcoming these defects. Among the slides was that of an interesting table showing ten principal contributing factors to castings defects. Mr. Hambley urged that foundrymen confronted with defects first establish the fundamental cause of the defects, then go ahead and try to remedy them. Mr. Hambley suggested, in conclusion, that chapter members could greatly benefit each other by bringing up their particular casting defect problems for discussion by other members at chapter meetings.

Quad City

R. E. Miller
Deere & Co.
Chapter Secretary-Treasurer

First meeting of the new season was gratifying to both the new officers and the attending membership. The large crowd of over 100 members was a good return for effort spent in preparation, and the splendid technical session was a good indication of what can be expected throughout the year.

The evening's speaker was Elmer Zirzow, Deere and Co., Moline, Ill., who discussed *"Molding and Core Sand Mixes."*

Mr. Zirzow mentioned that many modern mechanized foundries test and record sand checks, yet do not act upon this information.

Feel of the sand is still the ultimate test, Mr. Zirzow said.

Local sands were discussed by the speaker, who compared them with the St. Peter's sandstone of Ottawa, Ill. Slides showing the Ottawa sand indicated a near-round grain. Local sand

FUTURE CHAPTER MEETINGS

● DECEMBER 1 (cont'd)

WESTERN NEW YORK
Sheraton Hotel, Buffalo
Joseph M. Clifford
Bison Castings Co.
"Nodular Iron"

ONTARIO
Catholic Culture Center, London
W. A. Campbell
Bakelite Co. (Canada) Ltd.
"Croning Process"

● DECEMBER 2

N. ILLINOIS - S. WISCONSIN
Faust Hotel, Rockford, Ill.
CHRISTMAS PARTY

● DECEMBER 4

CHICAGO
Chicago Bar Association
S. C. Massari
A. F. S. Technical Director
Film: *"Fluid Flow in Transparent Molds—No. II"*

● DECEMBER 6

TOLEDO
Toledo Yacht Club
"Chemically-Coated Sand"

CENTRAL PENNSYLVANIA
Art Gallery, School of Mineral Industries, Pennsylvania State College
Clyde A. Sanders
American Colloid Co.
"Effect of Certain Mold Materials on Mold and Core Mixtures"

● DECEMBER 7

SAGINAW VALLEY
Fischer's Hotel, Frankenmuth, Mich.
W. T. Bean, Jr.
Industrial Electronics, Inc.
"Good Casting Design—on Purpose!"

● DECEMBER 8

NORTHERN CALIFORNIA
Shattuck Hotel, Berkeley
Panel Discussion: *"Non-Destructive Testing of Castings"*

● DECEMBER 8 (cont'd)

CENTRAL OHIO
Brookside Country Club, Columbus
DINNER DANCE

METROPOLITAN
Essex House, Newark, N. J.
CHRISTMAS PARTY

SOUTHERN CALIFORNIA
Lakewood Country Club, Long Beach
CHRISTMAS PARTY

EASTERN CANADA
New Sherbrooke Hotel, Sherbrooke, Que.
Clyde B. Jenni
General Steel Castings Corp.
"Reclamation of Foundry Sands"

QUAD CITY
Blackhawk Hotel, Davenport, Iowa
CHRISTMAS PARTY

OREGON
Heathman Hotel, Portland
Christmas Party

● DECEMBER 9

CENTRAL ILLINOIS
American Legion Hall, Peoria
CHRISTMAS PARTY

● DECEMBER 14

TWIN CITY
Nicollet Hotel, Minneapolis
CHRISTMAS PARTY

ST. LOUIS DISTRICT
York Hotel, St. Louis
CHRISTMAS PARTY

● DECEMBER 15

WESTERN MICHIGAN
Spring Lake Country Club
CHRISTMAS PARTY

● DECEMBER 16

CINCINNATI DISTRICT
Netherland Plaza Hotel, Cincinnati
CHRISTMAS PARTY

grains showed sub-angular grain structure, the speaker said.

In the past it was thought that a one-screen sand was desirable. It offers the best permeability and maximum green strength. However, Mr. Zirzow pointed out, the trend is now toward distribution over many screens. This is accomplished through blending either at the quarry or when introducing sand into the system.

Other points stressed by Mr. Zirzow were: (1) fine sands produce fine finishes—regardless of other materials added, a smooth-surfaced casting can be obtained only by using a high-A.F.S.-number base sand and (2) moisture causes more scrap than any other sand constituent. Though the cheapest part of the mix, water often is used without proper controls. Too-much or too-little water can be the foundryman's headache, especially in a central sand system, he concluded.

Oregon

J. A. Larkin
Electric Steel Foundry Co.
Chapter Reporter

Season's activities opened with a dinner meeting at the Heathman Hotel, Portland, September 20. Meeting highlights were a talk on nodular iron by A.F.S. National Director Thomas E. Eagan, Cooper Bessemer Corp., Grove City, Pa., and introduction of new officers and members.

New officers introduced were: James T. Brodigan, Columbia Steel Casting Co., Inc., *chairman;* E. J. Hyche, Rich Manufacturing Co., *vice-chairman;* William M. Halverson, Electric Steel Foundry Co., *secretary-treasurer* and James T. Dorigan, Electric Steel Foundry Co., *program chairman.*

New members since the last meeting included: David E. Crabtree, Oregon State College Norman Rupp, Carborundum Co.; James L. Henderson, Rich Mfg. Co.; Paul Melchert, Gas Heat, Inc.; John F. Oettinger, Electric Steel Foundry Co.; Alfred I. Stuart, Industrial Engineer; Blake Jackson, Electric Steel Foundry Co.; Loren

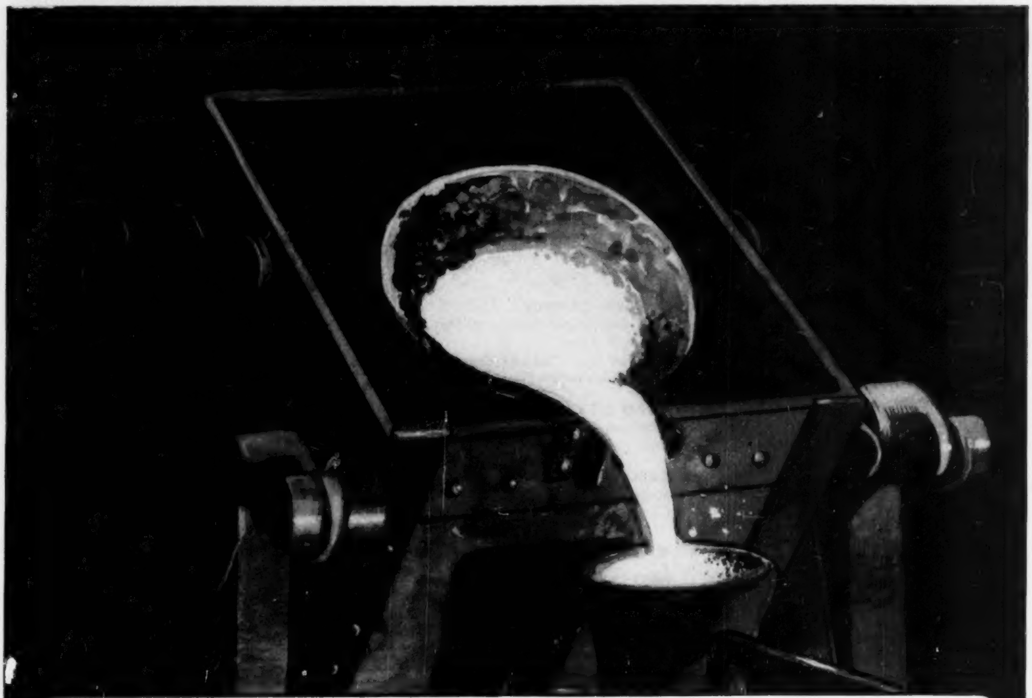
Controller W. Franklin of Caterpillar Tractor Co., Peoria, Ill., speaking on "What Makes Business Tick" at the first meeting of Central Illinois Chapter this season.

Beardsley, Crawford & Doherty Co.

Nodular iron and its practical aspects were covered by Mr. Eagan, who stressed that nodular iron is an excellent intermediate material between gray iron and cast steel, but does not at the present time try to compete in strength with alloy steel.

According to Mr. Eagan, graphite is the weak constituent of iron and the strength of the iron can be controlled by the amount of graphite. Graphite which is normally present in flakes in iron is in balls or spherulitic form in nodular iron, thus it has less surface area than the flakes and the iron has higher strength. Keel blocks have been found to give the best test coupons. Nodular iron can be made easily in cupolas, induction, and air furnaces, perhaps not as well in an electric arc furnace, Mr. Eagan said. It has excellent flowability; liquid shrinkage is higher than regular iron, but less than steel; cleaner metal is obtained by

(Continued on Page 79)



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CHAPTER ACTIVITIES

(Continued from Page 77)

using a teapot ladle and skin gates; dry sand molds give cleaner castings; nodular iron does not have grain growth at high temperatures like gray iron; it has excellent machinability below 300 BHN and leaves a good finish similar to steel. Gray iron has an impact value of from 10-14 ft lb whereas nodular iron (as cast) has from 50-90 ft lb and, heat-treated, has over 120 ft lb, the speaker said.

Mr. Eagan's talk was supplemented by slides of micro-structures and tables comparing physical properties. A feature, presented at this meeting for the first time, is the Defective Casting Clinic. Time will be set aside each meeting for the discussion and exchange of knowledge over questions relative to foundry problems that members of the chapter encounter in their operations during the month.

Eason G. Miller, assistant Inspector of Naval Material, Portland, advised the group that many new Army and Navy specifications had been issued in recent months and could be obtained through his office.

Northern California

Jay M. Snider
Jos. Musto Sons—Keenan Co.
Publicity Chairman

SIXTEENTH ANNUAL GOLF PARTY was held at Sequoyah Country Club, September 29 with some 130 foundrymen and guests attending.

Success of the affair can be attributed to Party Chairman Edward Brumley, Brumley-Donaldson Co., and Co-Chairman Clayton Russell, Phoenix Iron Works, who with their committee, worked tirelessly to stage an all-day-and-evening party that clicked on every occasion.

The following members and guests won the various prizes offered:

Door prize (television set)—Joseph Luscher, California Foundries; consolation prizes—Wesley and George Schimmelpfennig, California Foundries, Norman Olsen, General Metals Corp.

Golf prizes: low gross, foundryman—Arnold Boscacci, American Brass & Iron Foundry; low gross, guest—David Sutch, McDonough Steel Corp.; low net; foundryman—Charles Foster, General Metals Corp.; low net, guest—Edward Stephens, American Brass & Iron Foundry; blind bogie—Roy Haog, General Metals Corp.

A new feature of this year's tournament was the "hole-in-one" contest, in which two members succeeded in acing the hole—Peter Valentine, Jr., Del Monte Properties, Inc., and Past

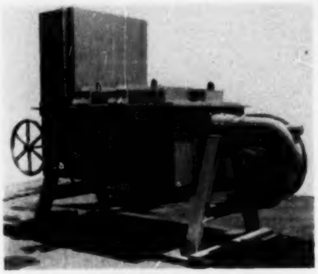
(Continued on Page 85)

NEW . . . Foundry . Products

Readers interested in obtaining additional information on items described in New Foundry Products should send requests to Reader Service, American Foundryman, 616 S. Michigan, Chicago 5, Ill. Refer to the items by means of the convenient code numbers.

Gas-Fired Melting Furnace

1—New gas-fired melting furnace features mixing action equally applicable to all types of ferrous and non-ferrous alloy melting. Furnace discharges exhaust gases and heat above work area and is claimed to be less noisy than crucible furnace of half its capacity. No work necessary before starting each morning, as in cupola practice. The following are manufacturer's data on furnace—(1) In gray iron melting, 400-lb capacity unit averages 24 min per heat at minimum tapping temperature of 2850 F. Gas consumption per heat is approximately 2400 cu ft. Reported refractory life is 300 heats, and time required for relining is 20 hrs; (2) In brass and bronze melting, 400-lb capacity furnace



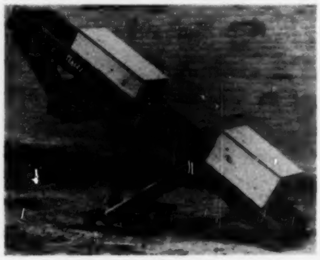
averages 13 min per heat at minimum tap temperature of 1975 F. Heats per lining are estimated at 1000 by manufacturer. Man hours required for relining: 20 maximum. Number of heats per roof: at least 1000. Approximate gas per heat: 1100 cu ft. Heat used: 425#–83-9-5 bronze and 88-10-2 bronze. *Reda Pump Co.*

Crane Cab Ventilation

2—Two new crane cab conditioners ventilate, heat and provide dust and fume protection. Model VHDF provides continuous ventilation, heating, dust filtration and fume protection for crane cabs and small confined spaces in industrial plants. Model VHD is intended for use where noxious fumes are not a problem but where dust filtration, ventilation or heating may be required. Fan sections can be rotated 90 degrees for continuous discharge of air from tops on either side. Air is heated when necessary by electric strip heaters maintaining controlled 68 to 72 degree temperatures. Units can be installed in horizontal, vertical or inverted position. Model VHDF is 16 in. deep x 26 in. wide x 42 in. high. Model VHD is same depth and width but only 26 in. high. Both operate on a-c or d-c. *Dravo Corp.*

Lightweight Package Conveyor

3—Model 485-C, a low-cost, lightweight channel frame conveyor is capable of



handling bags, boxes, cartons, etc., from ground level to convenient height above truck body. Caster wheel or pneumatic tired mounting for easy portability. *George Haiss Mfg. Co., Inc.*

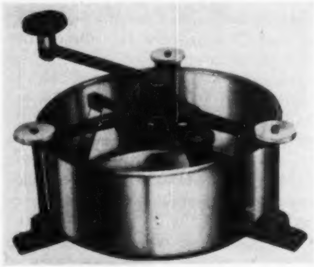
Metallograph

4—Designed as routine control instrument, improved metallograph is claimed by manufacturer to offer superior optical performance and simplicity of operation.

All controls and adjustments are within easy reach, including 5 x 7 in. camera, monocular or binocular eyepieces; ball-bearing mechanical stage; and electrical control panel for arc and visual lamps. Four objectives on rotating turret, photographic eyepieces mounted on quick-change slide, camera shutter and color filters are all operable from sitting position. Ferrous or non-ferrous grain size measurements are compared directly on ground glass with standard grain size charts. Case depth and linear measurements are easily and accurately made with accessory micrometer rule. Standard ASTM magnifications from x50 to x1500, with x2000 available on special request. Further details available. *American Optical Co.*

Utility Sand Mixer

5—Utility mixer readily mixes laboratory samples and experimental batches for investigating and testing molding and core sand mixtures. Chief advantages claimed by manufacturer are durability, simplicity of construction and operation, sufficient size to permit mixing of ade-



quate samples, thorough mixing in short time and ease of cleaning. Hand-operated, unit has stainless steel mixing bowl 12 in. in diameter and $5\frac{1}{2}$ in. high. Mixing unit consists of revolving arm with scraper at one end and mixing paddle that revolves on own axis at other end. *Claud S. Gordon Co.*

Thermocouple Vacuum Gages

6—Redesigned line of thermocouple vacuum gages for industrial and laboratory applications includes 115-volt, a-c, portable thermocouple vacuum gage and types for both rack and panel mounting. Usable on either glass or metal vacuum systems, gages give continuous indication of pressure and respond almost instantly to pressure changes. Pressure can be read directly from scale calibrated from 0-200 microns. Gage is connected to gage tube electrically and may be disconnected from

tube without disturbing vacuum system. Gage tube may be interchanged without need for recalibrating indicating instruments and is built to withstand damage if accidentally operated at atmospheric pressure. *General Electric Co.*

Fluid Cooler Line

7—Dry-type fluid cooler line includes units with capacities from 66,250 to 7,630,000 btu per hr and is applicable to cooling of furnaces and cupola linings. Unit consists of core — an extended surface heat transfer coil built up from nonferrous fins and tubes—which contains liquids to be cooled. Specially-designed propeller fan blows large volume of air across coils and is housed in heavy-duty casing. Simple combination of coil circuits makes it possible for one unit to dissipate heat from two or three different fluids simultaneously. Smallest standard unit will handle 2200 cfm and flow of 20 gal of water per min. The largest, with 144.31,MM 34 hp fan, handles 220,000 cfm and flow of 1,000 gallons. *Trane Co.*

Packaged Welding Alloys

8—Welding, brazing and soldering rods, both bare and flux-coated are available packaged in standard 5- and 10-lb high-strength corrugated cartons. Package labels contain general instructions for low-temperature welding, brazing and soldering and specific instructions for applying the particular rod in the package. Identification, size and quantity are repeated on end of box as a convenience to storekeeper. *All-State Welding Alloys Co.*

Hardness Tester

9—Portable, direct-reading hardness tester for on-the-job direct readings of any shape or form of metal allows fast testing of repetitive or assembly line work by unskilled labor. Instrument gives direct Rockwell, Brinell, Diamond Pyramid, or Tons Tensile readings. Performance is not affected by temperature variation. High range is 25-65 Rc. Medium range 35-75 Rockwell A or 100-440 Brinell. Low range is 50-260 Brinell. *Newage International.*

Conduit Hole Puller

10—Pump-operated draw bar pulls ½-in. to 4-in. conduit holes without manual exertion, eliminates danger of short-circuiting adjacent wires and will not warp, break, tear or distort metals. Successfully applied on metals up to 10 gage, draw bar develops 12,000-lb pressure on cutting surfaces from 90-lb pressure on handle and cuts clean, smooth-edged hole in less than 1 min. Shipped completely assembled and packed in compact metal carrying case. *Patterson Equipment Co.*

Scale Model Plastic

11—A new plastic that can be made into scale models of machine parts and tools provides "internal vision" for industrial laboratories. Three-dimensional scale models cut from this plastic enable scientists to obtain a color portrait of stresses encountered in tools and machine parts. When viewed through special polarized light, the stress pattern appears as a series of vari-colored lines showing where major stresses are located, in which direction they are acting and how great they are The photo-plastic can be cast in cylindrical or rectangular chunks 8 in. in diameter and 36 in. long and is 35 per cent more sensitive than ordinary photoplastic. As a result of this sensitivity, more lines appear under polarized light, permitting more accurate diagnosis of stresses. *Westinghouse Electric Corp.*

Metal Spray Gun

12—Compact, simplified spray gun is designed for spraying of low melting alloys and metals in conjunction with a new method of making aluminum core boxes (*American Foundryman*, September, 1950, Pp.30-31). Important features of gun include adjustable spray; non-clog, nondrip nozzle; thermostatic control; lightweight and 7 lb. metal capacity. Spray King unit is suitable for intermittent or production spraying and is ruggedly built for long life. *Cooper Alloy Foundry Co.*

Screw, Bolt Tightener

13—Impakdriver, a simple hand tool operating on a cam principle that translates a hammer's blow into a large amount of torque, tightens or loosens screws, bolts and nuts with only a twist in the desired direction and a few raps with a hammer. Useful for starting stubborn, rusted or frozen-on nuts, bolts and screws. Impakdriver is also useful for work in hard-to-reach places. Unit is sold separately or with different combinations of bits and sockets for various sizes and types of screws, bolts and nuts. Recommended by manufacturer for maintenance men, mechanics or anyone who uses wrenches and screwdrivers. *H. K. Porter, Inc.*

Molten Iron Pyrometer

14—Ferrotemp, an immersion pyrometer, measures temperature of molten white and gray irons in small ladles. Unit is 64 in. long with direct-reading room-to-3000 F meter and easily-replaceable 6 in. thermocouple with ceramic covering. Temperature reading does not exceed 25 seconds when unit is warm from previous use. When cold, unit requires only 45 seconds for reading. Temperature scale is 6-in. long, with sub-gradation at 20 degrees, allowing interpolation to 10 degree. Reflector insulator shields operator's hand from molten metal heat. Meter is fully compensated from ambient temperature and for change in resistance due to temperature change of extension leads. *Harry W. Dietert Co.*

Layout Protractor Table

15—Designed to facilitate checking or layout of castings, patterns and coreboxes without disturbing original set-up is the Series No. 30 layout protractor table. Unit uses an indicator and vernier on adjustable arm to permit direct readings, accurate to within 10 minutes. Indicator

(Continued on Page 94)

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FOUNDRY *Literature*

Readers interested in obtaining additional information on items described in Foundry Literature mail postcard below to Reader Service, American Foundryman, 616 S. Michigan Ave., Chicago 5. Refer to items by circling the convenient code numbers.

Abrasive Shot

16—Booklet No. 59 describes Tru-Steel shot, a tough, hard, fully blast-treated abrasive that wears down slowly but does not break down. Booklet shows photographs of shot after various periods of wear life and gives case studies, supported by letters from users. *American Wheelabrator & Equipment Corp.*

Abrasive Wheels & Discs

17—50-page pocket catalog describes design and application of abrasive wheels and discs and includes tables of peripheral speeds at varying rpm. maximum peripheral speeds for resinoid bonded abrasives, grades and markings. Merits of resinoid bonds are discussed briefly, as are advantages of wheels custom designed to meet individual production needs. *Charles H. Besly & Co.*

Induction Heater

18—Bulletin 319 lists specifications, applications and advantages of the Combustron, a high frequency induction heater for carbon-by-combustion analysis in steel. Unit will accommodate all types of steel samples, ranging from coarse to fine meshes and low to high carbon content and lowers operating costs through elimination of combustion tube. *Burrell Corp.*

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81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Drill Presses as Threaders

19—Vol. III, No. 8 of Die Headlines features a three-page article on use of drill presses as threaders. Method of converting drill presses to threaders at moderate cost requires only an adapter to take the shank of the die head and a yoke to open and close the die head. Illustrated are typical applications of this method. *Eastern Machine Screw Corp.*

Air Foam Catalog

20—24-page illustrated booklet describes air foam fire fighting equipment, applications, high and low expansion foam compounds, specifications and operating characteristics for five sizes of portable playpipes, mobile and stationary foam proportioning tanks and installations of pressure line inductors, etc. *Pyrene Mfg. Co.*

Elevators and Cranes

21—36-page revised booklet 4951 presents the entire line of Barrett elevators, portable cranes, hand and electric hoists. Featured is a new line of low-priced, portable elevators available in 500, 1000 and 2000 lb capacity. Characteristics of elevators are given in detail: safety features, cable safety device, protected sheaves, thermal overhead switch, slack cable switch, enclosed gears, direct-connected motor, etc. *Barrett-Cravens Co.*

Hydraulic Cylinders

22—Catalog No. 233-A contains 28 pages of illustrations, specifications, design, construction and operation features of complete line of high-pressure hydraulic cylinders, designed for applications where controlled push, pull, lift or clamp is desired and for working pressures up to 1500 psi. *Hanna Engineering Works.*

Aluminum Fluxes

23—Bulletin describes two aluminum fluxes—Aluco, for degasifying and purifying aluminum and aluminum alloys used in sand casting—and Aluco "S" for die casting aluminum base metal and permanent mold castings. Aluco, designed for use in reverberatory and crucible furnaces, assures uniformly sound, dense-grained castings by removing gases absorbed during melting, dissolving and removing oxides, increasing fluidity, removing dirt, reducing dross and forming a protective coating during melting. Aluco "S", specially compounded for die casting aluminum and permanent mold castings, minimizes rejections and produces sound castings by reducing oxidation and removing non-metallic inclusions. *Atlantic Chemicals and Metals Company.*

CHAPTER ACTIVITIES

(Continued from Page 79)

Chapter President Edward Welch, American Manganese Steel Div., American Brake Shoe Co. Others were close, including Gene Boscacci, American Brass & Iron Foundry; Fred Scherer, retired; "Mac" McKelvie, Pacific Brass Foundry; and Luverne Silva, Graham Mfg. Co.

Chapter Director Jay Snyder, Jos. Musto Sons–Keenan Co., won the putting contest, winning an ice bucket. A large serving platter was awarded Samuel Russell, Phoenix Iron Works, for being "farthest from the hole." Mr. Russell also served as official party photographer.

First meeting of the 1950-51 season was held at the Hotel Shattuck, Berkeley, September 15 and featured a talk by A.F.S. National Director Thomas E. Eagan, Cooper Bessemer Corp., Grove City, Pa., on the subject of *"Nodular Iron."*

Mr. Eagan pointed out what has been done with this type of iron and its future possibilities. He explained uses that nodular iron has been put to and where it can still be put into application. His talk was illustrated with slides comparing steel, cast iron and nodular iron with regard to tensile strength, bursting pressure, etc.

Weldon Russell, Phoenix Iron Works, was the recipient of four tickets to the Forty-Niners' football games this season as a result of winning the attendance and door prize drawings.

Chapter President John Russo, Russo Foundry Equipment Co., pointed out that the chapter was requested to support the A.F.S. Northwest Regional Conference in Seattle on October 13 and 14 and that members desiring to go should make their reservations early.

Northwestern Pennsylvania

Earl M. Strick
Erie Malleable Iron Co.
Chapter Secretary

FIRST MEETING of the 1950-51 season was held in the Blue Room of the Moose Club, Erie, with nearly 100 members and guests present.

Following dinner, Chairman Frank Volgstadt of Griswold Mfg. Co., Erie, briefly spoke about chapter activities for the coming year. He stressed the necessity of all members giving utmost support to the membership committee, headed by Bailey Herrington, Hickman-Williams Co. and asked that all members support the American Foundrymen's Society's drive to obtain funds for a new building. Fred Carlson, Weil-McLain Co., Erie, co-chairman, entertainment committee, presented a technicolor movie entitled *"Figures That Lie."*

Speaker for the technical meeting was Alfred Boyles, United States Pipe and Foundry Co., Burlington, N. J., who spoke on gray iron metallurgy. Following a discussion period, the chairman announced that three extra meetings of the chapter would be held in Meadville, Pa., Dunkirk, N. Y., and New Castle, Pa. Dates and speakers will be announced later.

It was announced that the Skinner Engine Co. had closed its foundry and moved the patterns and a part of the personnel to the Erie City Iron Works. Among the personnel moving was Joseph Schwaab, long a member of the A. F. S. This is the second of the nearly century-old foundries to close up in Erie during the past year. Jarecki Mfg. Co., the first, was purchased by Porter Co. and moved to Tulsa, Okla.

Steve Stroup, Peerless Sand Products representative, attended his first meeting since his near-serious automobile accident and all were happy to see him in circulation again.

Leo Carney and Carl Minzenberger, two representatives of the State Employment Service, spoke briefly on labor conditions in the foundry in-

dustry in the Erie area. They stated that the situation is acute at present and from indications it will be worse in the near future and everything possible should be done to break in new help and use every means to retain old employees.

Wisconsin
Don Gerlinger
Walter Gerlinger, Inc.
Publicity Chairman

FIVE SECTIONAL MEETINGS comprised the October 13 meeting, held at the Schroeder Hotel, Milwaukee.

Non-Ferrous and Technical groups combined to hear a talk by J. H. Mikuta, general sales manager of the Milwaukee Gas Light Co. on *"Convert Your Foundry to Gas."* Assisting Mr. Mikuta were G. F. Kurtz and C. C. Desmond, industrial engineers, Milwaukee Gas Light Co. C. P. Kotowicz of Ampco Metals, Inc., was chairman of the meeting and K. L. Jacobs, Standard Brass Works, reported on a foundry in another area that converted to gas two years ago.

The Malleable group meeting was conducted by I. Dennen and H. Weimer of Beardsley & Piper Co. who began their session on sand mixing with a movie *"Progress in the Mulling of Foundry Sand."* Evolution of sand mulling was the basic topic, illustrating the various types of machinery, from the first machines used a thousand years ago and drawn by oxen, to the present high-speed muller, which can mix and dispose of a ton of sand per minute. N. Amrhein, Federal Malleable Iron Co. was chairman of the meeting and was assisted by J. Kropka of Chain Belt Co.

Steel Group heard a very interesting discussion by W. H. Owen of Harbison-Walker Refractory Co., Pittsburgh, *"The Properties and Use of Various Molding Materials other than Silica Sand."* E. G. Tetzlaff of Pelton Steel Casting Co. was chairman and V. E. Ziemer of Maynard Electric Steel Casting Co. was co-chairman.

"Gating and Scrap Castings" was presented to the Gray Iron Group by Thomas E. Barlow, Eastern Clay Products, Inc., Jackson, Ohio. Mr. Barlow indicated that top risers are almost always worse than no risers at all and when risers are used they should be side risers with small ingates and a surrounding mass of metal to keep it liquid. In all cases of gating, he suggested getting the metal into the mold as rapidly as possible and use of the progressive choke with 1 for the area of the ingates, 1.2 for the area of the runner and 1.4 for the area of the down screw. His speech ended with emphasis on the study of hydraulics in gating. G. P. Antonic, Motor Castings Co., acted as chairman of the meeting.

K. F. Yonker of the Blower Condenser Department, Allis-Chalmers Mfg. Co. supplemented his discussion *"Recent Developments in Precision Casting"* with a color sound film and sketches. This was presented to the Pattern group, of which A. Fischer, Chas. Jurack Co. was chairman and J. Anderes, Belle City Malleable Iron Co., was co-chairman.

St. Louis District
Norman L. Peukert
Carondelet Foundry Co.
Chapter Reporter

SEASON OPENED with an attendance of 100 at the September 14 meeting, held at the York Hotel, St. Louis.

First line of business was the introduction of new officers. New Chairman John Williamson was presented with a gavel made by Local Patternmaker Emil Georger, by Past Chairman George Sheppard, who made an inspiring presentation speech.

Speaker of the evening, James H. Smith, Central Foundry Division, General Motors Corp., was introduced by George W. Mitsch, American Car and Foundry Co.

The subject of his talk was: *"Future of the Foundry Industry."* Mr. Smith told of different steps to be taken by

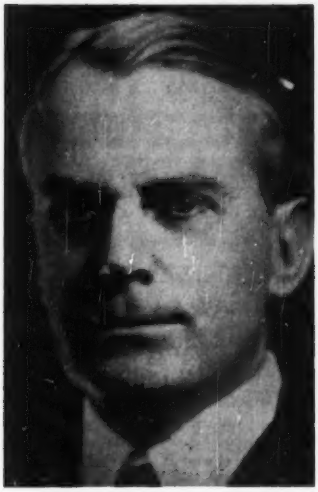
the foundry industry to keep it ahead of competitive industries. The first step, he said, is to clean up the average foundry and make it a better and more desirable place to work.

Northeastern Ohio

Robert H. Herrmann
Penton Publishing Co.
Publicity Chairman

CURRENT SEASON opened with a clambake dinner at Tudor Arms Hotel, Cleveland, September 14. Some 176 foundrymen heard Clyde A. Sanders, American Colloid Co., Chicago, speak on *"Some Suggestions on Sand and Molding Practice."*

Mr. Sanders discussed hot sands and their effect on casting quality. He stated that good foundry practice requires maintenance of a sand supply



Speaker at Philadelphia Chapter's 1950 Management Dinner, to be held at the Union League Club, Philadelphia, Nov. 21, is General Donald Armstrong, president, U. S. Pipe & Foundry Co., Florence, N. J. General Armstrong's timely and important topic is "Company Planning for Industrial Mobilization."

that is five times the weight of metal tonnage poured daily in the foundry.

Use of a blower to cool sand, according to Mr. Sanders, removes fines, leading to rough castings and surface defects such as scabs. He recommends replacing these fines by adding them to the sand in the form of a slurry.

In discussing test work he had done on metal shrinkage, Mr. Sanders stated that the sand with the greater flowability produced least shrinkage and

least mold deformation. However, he added that when a finer screen sand was added to the mix to obtain better casting finish, more water was necessary to obtain flowability, resulting in casting shrinkage. Best results in obtaining good casting finish and minimum shrinkage were obtained by addition of four to five per cent seacoal or ½ per cent wood flour to the sand mix.

At the patternmaking session under the direction of Peter Rettig, Rettig Pattern Co., Cleveland, a wide range of topics was considered. In the discussion it was pointed out that Peruvian mahogany was somewhat harder than the Honduras type, and preferable where severe usage is encountered. Life expectancy of well constructed steel-faced mahogany patterns was given as at least 5000 molds, and cases of 10,000 were cited.

Attention was directed to the necessity of heat treatment of aluminum alloy core driers previous to use to eliminate growth. A triple treatment at 450° F was recommended. A question was raised as to the proper shrinkage allowance on wood masters for aluminum alloy patterns, and the consensus was that there is no standard since the intricacy of the form, method of gating, etc., required variations in shrinkage allowance.

Rochester

Donald E. Webster
American Laundry Machine Co.
Chapter Reporter

FALL SEASON opened with an outing at Barnard's Exempt Firemens' Association grounds on September 16. This was the Seventh Annual Picnic and, as in past years, local foundrymen, out-of-town guests and friends turned out to make the day a complete success. Attendance was close to 200.

Leon C. Kimpal acted as general chairman and arranged a program of sports and games. A number of substantial prizes were awarded to the winners. Large quantities of clam broth, steamed clams, hot dogs, barbecues, and corn were consumed during the afternoon.

Central Pennsylvania

R. W. Lindsay
Pennsylvania State College
Reporter

First meeting of the season was held September 28 at Pennsylvania State College's School of Mineral Industries. Some 30 foundrymen turned out to hear Adam Mahonske, Semet Solvay Division, Allied Chemical and Dye Corp. speak on the subject of "Cupola Operation."

Mr. Mahonske chose to cover the little details of cupola operation, which might make or break the operation. He spoke at some length concerning

points common to all cupolas, including patching, bed preparation, removal of fines from fuel, accurate weighing of all materials, proper distribution of charge, bottom preparation, avoidance of packing of the charge, and minimizing coke breakage. The speaker then turned his attention to details involved in individual cupolas, and discussed such items as size of coke and iron charges, bed height and air requirements.

A very interesting question and answer period followed in which the audience indicated interest in certain operation features, recommended by the speaker, concerning bed preparation and the use of kindling tuyeres.

Tennessee

Carl A. Fischer, Jr.
Fischer Supply Co.
Chapter Reporter

TENNESSEE CHAPTER held its Annual Barbecue at Signal Mountain Golf and Country Club on August 26, with 400 members and guests playing golf, horse shoes, swimming, darts, and badminton. Those that did not play enjoyed meeting and talking with old friends they had not seen for some time.

A special feature was furnished by Bob Hise and his small son, who gave a tumbling and balancing demonstration. The barbecue was excellent, consisting of pork and beef, potato salad, slaw, pickles, french bread, and coffee, beer, or coca-cola.

Richard Kirchmayer, representing the Sterling Wheelbarrow Co., was general chairman of the Barbecue, and was assisted by Burt Mullenix, Fred H. McGee, Herb Dent, Porter Warner, Jr., Howard M. Barker, Jim Minter, Vernon Eason, Charles Appel, and Carl A. Fischer, Jr.

The winners of door prizes were: Knox Riley of U. S. Pipe Foundry Co. —electric drill donated by Rogers Bailey Hardware Co. Earl Thompson, Wheland Co.—fishing rod and reel donated by Porter Warner Jr.: Mr. Payne of Hajoca Corp.—picnic kit given by Lovemans, Inc.: L. E. Weaver, Lewisburg Casting Co.—picnic table kit donated by Howard Nelson, Hill and Griffith Co.: Earl Wright, Dixie Industrial Service—barbecued chicken given by Herb Dent.

George Acton, Combustion Engineering Corp.—pen and pencil set donated by Nixon Machinery Co.: Arley Peak, Ross Meehan Foundry Co.—traveling kit donated by Charles A. Krause Milling Co.: A. D. Willis, U. S. Pipe & Foundry Co.—two bottles donated by Mountain Beverage Co.: Frank Vanderford, Crane Co., bottle given by Robbins & Bohr, Inc.

C. C. Ich, Combustion Engineering

(Continued on Page 92)

FOUNDRY FIRM *Facts*

General Electric Co. officially opened its new Measurements Laboratory, believed to be the most modern and best equipped of its kind in the world, on October 30 at Lynn, Mass. Staffed by engineering specialists in metallurgy, chemistry, magnetism, electricity, sound, heat, light and color, the new laboratory contains complete facilities for applied research product development and design in the measurements field. Located adjacent to G-E's West Lynn Works, the laboratory is housed in a five story building with 142,000 sq ft floor space. Laboratory is divided into three major functional groups—advanced engineering, materials and processes and general service sections. Each is completely equipped and self-contained.

Metropolitan Refractories Corp. announces the removal of its offices from 16 Park Row to 50 Church St., New York 7.

U. S. Engineering Corp., a new organization with offices at 316 East Silver Spring Drive, Milwaukee, has been formed by Charles T. Jorgensen to engineer, manufacture and erect conveyor and materials handling systems. The corporation is already engaged in designing, manufacturing and erecting conveyor systems for A. O. Smith Corp., Milwaukee; Nash Body Div., Nash-Kelvinator Corp., Milwaukee; Nash Motors Div., Nash-Kelvinator Corp., Kenosha, Wis.; and Allis-Chalmers Mfg. Co., Milwaukee. Simultaneous with the opening of the main office in Milwaukee was the opening of a district sales office at 19350 Littlefield, Detroit, headed by Vice-President J. H. Fletcher and Vice-President and Treasurer L. F. Miller.

Canadian Car & Foundry Co.'s Longue Point Plant was recently awarded a safety certificate for "outstanding cooperation in accident prevention work in 1949" by the Quebec Association for the Prevention of Industrial Accidents. During the period from 1944 to 1949 Longue Point's accident frequency rate dropped from 82.4 to 27.8, a decrease of 66 per cent. This safety record is attributed by company officials to (1) instruction of new employees, (2) safety talks in all departments in both French and English, (3) safety meetings for supervisory groups, (4) introduction of a safety instruction program for foremen, (5) formation of a good housekeeping committee, (6) introduction of a system of investigating trivial and lost-time accidents and correction of deficiencies, and (7) cooperation between workers and supervisors in safety matters.

The Westwick Foundry, Galena, Ill., re-opened the middle of October under the ownership of J. F. Shanley and G. A. Shanley of Chicago. Manned by some 125 employees, the foundry will produce light and medium gray iron castings. A like number are employed in a Shanley-owned plant in Stoughton, Wis. John Westwick & Son, Inc., was organized in 1854 and has operated continuously until recently producing castings for the mining demands and structural needs of Galena. In recent years production was devoted almost exclusively to cast iron furnaces.

Franklin Metals Co. is the new name of **Franklin Iron & Metal Co.** Located at 134-38 Rome St., Newark, N. J., the firm will continue to deal in aluminum, brass, copper, zinc and other non-ferrous scrap.

Precision Shot Co., formerly of 6432 Cass Ave., Detroit, has moved into new and larger quarters at 114 South Woodward Ave., Birmingham, Mich. New mailing address of the company is Post Office Box 55, Birmingham, Mich., and new telephone numbers of the company are MIdwest 4-4808 and ENterprise 6251.

Union Malleable Mfg. Co. has issued a 12-page booklet designed for employees of Union Malleable and its subsidiaries, Ashland Malleable Iron Co. and Union Brass & Copper Co., all of Ashland, Ohio. Following an introduction and a message from President Jackson, the booklet opens with a section on the company and its relationship to its employees. This is followed by a brief but comprehensive description of the various operations of the company, its products and its history. Concluding the booklet is a section intended for non-foundry and non-machine shop employees, such as clerical workers, shipping room personnel, salesmen, etc.

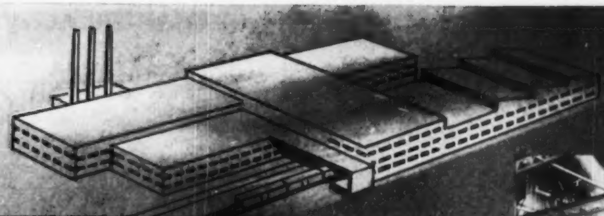
Connecticut Non-Ferrous Founders Meet

General discussion of current foundry problems was the keynote of the Connecticut Non-Ferrous Foundrymen's Association's September 20 meeting, held at Indian Hill Country Club, New Britain.

Discussed at length were sand additives, molding machines, solid flasks and bottom boards vs. snap flasks, sand sticking to hopper in mechanized foundries, labor shortages, sand supplies, changing of alloys to meet deliveries and spread supplies, government controls and transport of supplies and finished goods.

Indiana Foundry Donates Molding Machines To Purdue University

Recently donated to Purdue University's Foundry Laboratory by Swayne, Robinson & Co., Richmond, Indiana, foundry, were these two molding machines. Shown at the presentation are, left to right: Charles Robinson, president of Swayne, Robinson & Co.; Professor R. W. Lindley, chairman of Purdue University Shops; Robert Spurgin, III, head of Swayne, Robinson's Development Engineering and Methods Department; and Professor H. A. Boltz, head of Purdue University's General Engineering Department. This gift exemplifies the close cooperation between Indiana's foundry industry and the state's educational institutions.



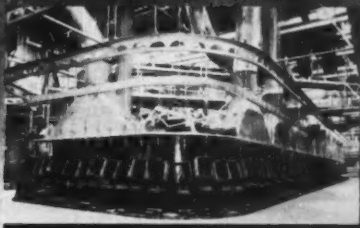
DESIGN

FABRICATION

INSTALLATION

"for all three call K&B!"

For 42 years, Kirk & Blum has specialized in the DESIGN, FABRICATION and INSTALLATION of efficient, dependable systems for the removal of dust and fumes.



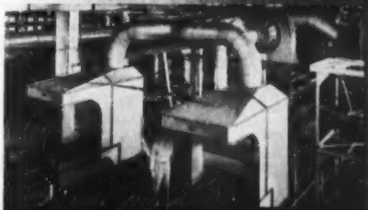
View in new Southern Foundry, shows pouring station with K & B system which removes smoke and fumes as they are formed.

"Shakeouts" in the foundry of a noted implement firm equipped with K & B Dust Control System.

DESIGN: Kirk & Blum engineering specialists survey your plant and then design your system, selecting equipment most suitable for your problem.

CONSTRUCTION: Kirk & Blum fabricates the complete system (equipment excepted), "tailor made" for your installation.

INSTALLATION: The Kirk & Blum contract includes responsibility for the entire system, installed by mechanics with years of specialized experience in the installation of such systems. As a result, you have one undivided responsibility —one complete contract for an installed system, ready to operate.



Another K & B system for production line shakeouts. Note that Dust Control equipment does not interfere with production.

K & B Plenum Chamber Hood for mold conveyor operation. Note bolted section construction for ease of maintenance.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

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DUST AND FUME CONTROL SYSTEMS

THE KIRK & BLUM MFG. COMPANY
2876 SPRING GROVE AVE.,
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CHAPTER ACTIVITIES

(Continued from Page 89)

Corp.—gold pencil donated by Fischer Supply Co. James K. Snee, U. S. Pipe & Foundry Co.—$25.00 worth of paint from Gilman Paint and Varnish Co.; Leroy Train, Lucy Boiler Co.—electric lantern given by Mills and Lupton Supply Co.; Hugh Sawrie, H. M. Sawrie Co.—shirt donated by Browning and Hamilton.

The attendance was greater than the previous two barbecues, showing an increasing interest on the part of foundrymen of this area.

Chesapeake

Arthur A. Rauchfuss, Jr.
Prenniman & Browne, Inc.
Chapter Reporter

Joint meeting with the Conestoga Foundrymen's Association at Lancaster, Pa., September 22, opened the Chapter's 1950-51 season. Two plant visits, lunch, dinner and an evening technical session made up the all-day program.

The first of two visitations started off in the morning at the plant of the Columbia Malleable Casting Corp., Columbia, Pa. Here most of us found a plant much different from that in which we work. Everything was completely mechanized and organized to use a minimum of direct labor. It was inspiring to see a plant of this type in operation. Approximately 130 members of the two chapters toured the plant in groups of ten. All phases of the plant's operations were shown and explained by guides.

The members then adjourned for lunch, after which they met at the York Corp., York, Pa. for the second visitation of the day. This foundry was in distinct contrast to the first. There was less routine work and most of the castings were much heavier—going as high as 15 tons. More manual and less automatic operations were used. After the tour of these two plants, the members convened at the York Outdoor Country Club for dinner and a business meeting.

The dinner speech, *"History and Development of the Foundry Industry,"* was made by Bruce Simpson, National Engineering Co., Chicago, who covered the progress of foundry practice in many countries throughout the ages. Notable in his lecture was the fine art the Chinese had developed in foundry work.

A. A. Hochrein, chairman of the Chesapeake chapter, conducted the meeting and introduced Nelson Albright of Columbia Malleable and Keith Loudon of the York Corp., to the gathering. The chairman expressed thanks to these two gentlemen for making these visitations available.

Abstracts

Abstracts below have been prepared by Research Information Service of The John Crerar Library from current American and foreign literature. For literature searches and translations of technical, industrial, and scientific literature, and photostats and microfilm, write to: Research Information Service, The John Crerar Library, 86 East Randolph Street, Chicago 1, Ill.

Aluminum Foundry Control Factors

98—STATISTICAL ANALYSIS. Richard R. Senz, "Quality Control of Aluminum Alloy Castings," *The Foundry*, vol. 78, July 1950, pp. 64-67, 208-210.

The effects of design and of foundry practices on quality control are considered along with inspection methods and the role of statistical analysis. The factors which are discussed in quality control are: appearance, dimensional accuracy, internal soundness, mechanical properties and chemical composition.

Manganese Bronze Analysis

99—RAPID AND ACCURATE METHOD. C. Goldberg, "A Fast Analysis for Manganese Bronze," *The Iron Age*, vol. 166, pp. 87-89.

A single sample method for the complete analysis of manganese bronze is presented. The technique used for the determination of copper, tin, lead manganese, iron, nickel, aluminum and zinc is described in detail. A table illustrating the reliability of the results and eight references are included.

Gray Iron Quality Tests

100—CORRELATE PROPERTIES. Bertil Tyberg, "The Quality of Swedish Cast Irons, *Gjuteriet*, vol. 40, July 1950, pp. 97-128.

Seventeen Swedish gray iron foundries of different size and production have cast 1680 test bars of 30-mm dia. which have been tested by the foundry laboratory of the SMF. The tests performed include chemical analysis, tensile strength, wedge-cutting strength and Brinell hardness. In some cases the structure has been examined. The correlations of strength and carbon equivalent, tensile strength and wedge-cutting strength, tensile strength and Brinell hardness have been worked out. The results obtained show good agreement with those presented in recent British and American investigations. The wedge-cutting test according to Ludwik-Krystof and Meyersberg has been subject to a special investigation to determine the influence of variations in wedge design.

Ductile Iron Properties

101—COMPARE CASTINGS AND TEST BARS. Edward M. State and Bernard L. Stott, "Some Experiences in Producing Ductile Iron," *The Foundry*, vol. 78, July 1950, pp. 80-83.

Several parts made of ductile iron are illustrated and a discussion of the mechanical and chemical properties of test bars representing one month's production is given. A table showing the comparative properties from various sections in castings and keel blocks is included. It is the opinion of the authors that castings can be produced having minimum specifications of 90,000 psi tensile, 65,000 psi yield strength, and 2 per cent elongation.

Modern Canadian Foundry

102—EQUIPMENT AND PRACTICE. "Feature of Iron and Steel Foundry Is Flexibility," *Canadian Metals*, vol. 13, July 1950, pp. 20-23.

The modern foundry at the Dominion Engineering Works, Lachine, Quebec, is described in detail. The sand plant, new melting unit, mold production, cleaning room, and plywood mounted patterns are discussed in this article.

Precision Castings With "C" Process

103—FINISH AND DIMENSIONAL REPRODUCIBILITY. B. N. Ames, S. B. Donner and N. A. Kahn, "Metal Parts with High Accuracy and Finish Produced by New Casting Process," *Materials and Methods*, vol. 32, Aug. 1950, pp. 43-46.

A new molding process known as the Croning, or "C" process is described in detail along with certain characteristics of the castings produced by this method. Excellent surface finishes are obtained with very sharp edges and detail. Precision measurements checking the dimensional reproducibility on a random selection of 15 castings disclosed that 11 of them had a maximum spread of 0.007 in. The process utilizes molds made of a dry mixture of silica sand and finely powdered phenol-formaldehyde resins. The mixture is poured against a hot metal pattern and held there a few seconds. After baking for 1 to 3 min at about 550 to 600 F, the mold which is a thin, even, insoluble shell of good strength and rigidity is stripped from the pattern.

Hard Chrome Plating

104—ELECTROLYTE ADDITIONS. J. Doskár, "The Influence of Various Additions to a Hard Chrome Bath on the Character of the Chrome Layer," *Hutnické Listy*, vol. 5, no. 6, 1950, pp. 240-247.

Results of several tests have demonstrated the possibility of exerting a favorable influence on the character of the different layers of hard chrome by a number of additions to the sulphate electrolyte. Some of the heterodemiacids widen the useful working range of electrolytes and give them characteristic features of fluoride-base baths without their chief shortcomings, the article states.

Centrifugal Casting

105—METAL FLOW RATE. James A. Clark, "Applied Hydraulic Theory Improves Casting Technique," *The Iron Age*, vol. 166, Aug. 10, 1950, 90-91.

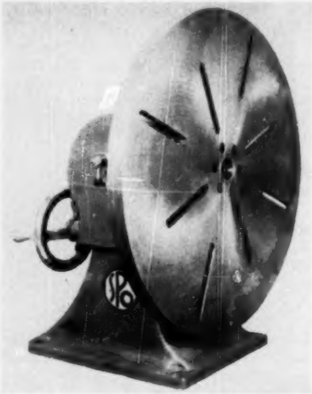
The application of hydraulics to determine the rate of metal flow so that it conforms to the solidification rate has improved the production of sound high quality centrifugal castings at the Watertown Arsenal. The problem is essentially the flow of liquids through an orifice and this is explained in detail.

NEW PRODUCTS

(Continued from Page 81)

For detailed information on any New Products listed, circle corresponding postcard coupon number, Pp. 81.

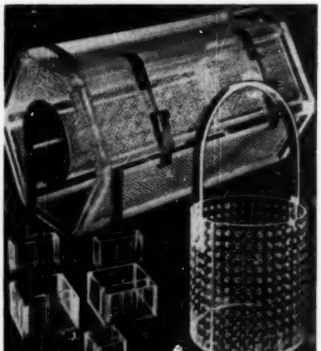
assembly can be set to operate on either side of table or at any intermediate position. Circumference of work table is graduated from 0 to 360 degrees in ½-degree



markings. Table can be set and locked in any position within 90-degree arc. Quadrant which locks table in position is graduated from 0 to 90 degrees in 1-degree markings to facilitate layout accuracy. *Spo, Inc.*

Lucite Pickling Baskets

24—High-temperature lucite pickling baskets for electroplating or chemical processing are claimed by manufacturer to last up to 100 times longer than ordinary



pickling baskets in baths "souped up" to cut pickling time from 12 hrs to 6 min. Features: versatility—change baths at will without contamination; insulated—no current loss; machineable; transparent—11 per cent clearer than glass; shatterproof, high impact strength, high modulus of elasticity; no-leak seams; lightweight; low cost. *Singleton Co.*

PERSONALITIES

(Continued from Page 71)

ate of the University of Michigan, Mr. Eness completed one year's graduate work on Organic Protective Coatings there, taught chemistry at Wayne University, and worked in supervisory chemical capacities at the E. J. Kelly Co., Grand Rapids Metalcraft, Grand Rapids Varnish Co. He was chief chemist for Alabastine Paint Products, Grand Rapids, for two years prior to joining Battelle Memorial Institute, Columbus, Ohio, as a research chemist on organic materials, the position he held just before joining the Acheson Colloids Corp.

R. J. Swartout, vice-president, was recently elected a member of the Board of Directors of the Belle City Malleable Iron and Racine Steel Castings Co.'s. Joining the company in 1919, he became successively, assistant sales manager, sales manager and in 1943, vice-president.

Lloyd E. Young has been appointed sales manager of the Superior Steel & Malleable Castings Co., Benton Harbor, Mich. Mr. Young has a background of 22 years' production, supervision, management and sales in the foundry industry.

STATEMENT OF OWNERSHIP

Statement of the ownership, management, circulation, etc., required by the acts of Congress of August 24, 1912, March 3, 1933, and July 2, 1946, of AMERICAN FOUNDRYMAN, American Foundrymen's Society, published monthly at Chicago, Ill., for October 1, 1950, State of Illinois, County of Cook, ss. Before me, a notary public in and for the state and county aforesaid, personally appeared Herbert F. Scobie, who, having been duly sworn according to law, deposes and says that he is the Editor of the AMERICAN FOUNDRYMAN, American Foundrymen's Society, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, and July 2, 1946, embodied in section 537, Postal Laws and Regulations, to-wit: 1—That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, American Foundrymen's Society, Inc., Chicago, Ill.; Editor, Herbert F. Scobie, Chicago, Ill.; Managing Editor, none; Business Manager, Wm. W. Maloney, Chicago, Ill. 2—That the owner is American Foundrymen's Society, Inc., not for profit, stock none. Principal Officers: President, Walton L. Woody, National Malleable & Steel Castings Co., Cleveland; Vice-President, Walter L. Seelbach, Superior Foundry, Inc., Cleveland; Secretary-Treasurer, Wm. W. Maloney, Chicago, Ill. 3—That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: none. 4—That the two paragraphs next above, giving the names of the owners, stockholders, and the security holders, if any, contain not only the list of the stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiants full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him. Herbert F. Scobie, editor. Sworn to and subscribed before me this 9th day of October, 1950. (Seal). C. L. Reilly, notary public. (My commission expires March, 1952).

Index to Advertisers

A. F. S. Employment Service

To contact "Help Wanted" or "Position Wanted" advertisers, write to American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, designating item number and issue of AMERICAN FOUNDRYMAN in which advertisement is published.

In replying to "Help Wanted" advertisements, please furnish resumé of experience, education and other pertinent qualifications.

HELP WANTED

HW542—Research Metallurgist: Experience in melting and casting of metals desired. Familiarity with ferrous and non-ferrous alloys required. Experience in following important: vacuum melting and casting, melting and casting of titanium, gases dissolved in molten metals, and effect of vibration on solidification. Opportunity to do publishable research in well-equipped laboratory. Minimum education B.S. from well-rated university; doctor's degree desirable. High-grade experience may be substituted for advanced degree. Minimum working experience four years progressive professional scientific employment including at least one year important and responsible work. Civil Service position.

HW543—Assistant Foundry Superintendent: with gray iron foundry experience, wanted for permanent position in mechanized foundry producing automotive castings, located in Middle West. Excellent opportunity with large reputable manufacturing concern. Write, stating experience, qualifications and expected salary.

HW550—Pattern Shop Supervisor: for steel foundry in Northwestern Ohio. Prefer a man experienced in railroad car castings. Furnish salary and other details on application.

HW551—Non-Ferrous Superintendent: non-ferrous foundry in Ohio needs experienced man to superintend aluminum and copper-base alloys sand casting plant. Must have outstanding ability in making castings on production basis. Excellent earning opportunity for man able to produce castings to specification. Salary or bonus arranged on basis of performance. In writing, state qualifications, background and salary required.

HW552—Foundry Metallurgist: modern gray iron foundry, located in Chicago suburb, desires man to assist in supervising cupola and electric furnace melting operations. Excellent opportunity with aggressive organization. State fully experience and qualifications.

HW553—Supervisor of Inspection: for steel foundry. Must be able to supervise department, have a knowledge of steel foundry practice, read blueprints; design jigs, gages and straightening dies; analyze defects and contact customer for better service and relationship.

HW554—Foundry Foreman: to take charge of mechanized gray iron foundry operation in the Central States area involving matchplate, cope and drag work. Please state qualifications and expected salary when answering.

POSITIONS WANTED

PW154—Plant Manager or Superintendent. Twenty-eight years of gray iron experience. Excellent practical training. Eighteen years in executive capacity. Experienced in production and jobbing, mechanized or non-mechanized. Age 47. Excellent character and references.

PW155—Foundry Engineer: Permanent mold, aluminum and magnesium—25 years experience in all phases estimating, designing, break-in, foundry control, production, and sales engineering. Age 43, available immediately.

For most effective dust suppression ... USE WATER!

Whiting Hydro-Clones are based on wet suppression, reducing foundry dusts to harmless sludge and absorbing most of the noxious gases.

This equipment is built by foundrymen for foundrymen. Whiting knows foundry dust suppression needs and how to meet them by stopping dust at its source.

If dusts from weigh hoppers, shakeouts, tumbling mills, and sand-handling contaminate your air, you will be amazed to learn how effectively and inexpensively these dusts can be controlled. Consult Whiting.

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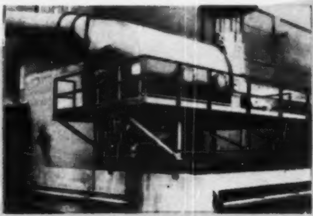
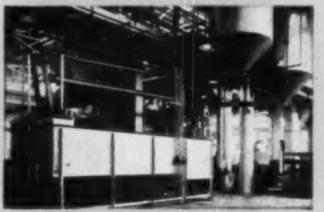
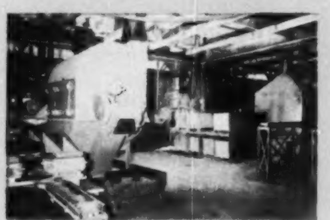


Typical outdoor installation of horizontal-type Hydro-Clone. Bottom pipes lead to sludge tank.



Two vertical-type Hydro-Clones suspension-mounted to save floor space.

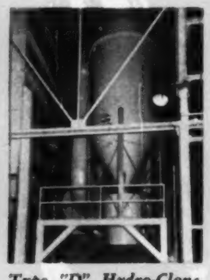
Conveyor hood draws off steam and dust from casting conveyor at dumping point.



"CH" Hydro-Clone collects dust from shakeout and sand-handling systems.

Cope shakeout and louvre system at flask breaking.

Mold conveyor enclosure, exhaust and return air system which conserves foundry heat.



Type "D" Hydro-Clone used to collect dust from coke, stone, and iron weigh hoppers.

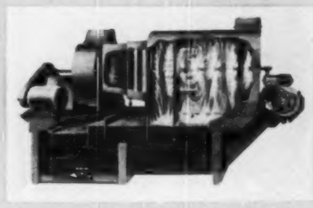


Diagram shows how swirling dust-laden air meets water sprays in Hydro-Clone.